Bureau of Land Management
White River Field Office
Meeker, Colorado

FIGURE FOUR NATURAL GAS PROJECT ENVIRONMENTAL ASSESSMENT

CO-WRFO-03-187-EA

RIO BLANCO AND GARFIELD COUNTIES, COLORADO

July 2004

Environmental Assessment of the Figure Four Natural Gas Development Project

CO-WRFO-03-187-EA

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Prepared for:

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1.0 INTRODUCTION

EnCana Oil & Gas USA (EnCana) has notified the White River Field Office of the USDI Bureau of Land Management (BLM) that it intends to apply for permits to drill and develop natural gas wells on its Figure Four leases in Rio Blanco and Garfield Counties in northwestern Colorado. Figure 1-1 provides a map of the general location of the Project Area. The proposed exploration and development wells, access roads, pipelines, and other ancillary facilities are located on federal and private lands.

Federal lands, including subsurface minerals, in the proposed Project Area are under the jurisdiction of the BLM White River Field Office, and policies for development and land use decisions are contained in the White River Record of Decision and Approved Resource Management Plan (ROD/RMP) (BLM 1997a). One of the objectives of the White River ROD/RMP is to, "Make federal oil and gas resources available for leasing and development in a manner that provides reasonable protection for other resource values."

The vast majority of the private lands proposed for drilling in the Figure Four Project Area are split estate properties, where the surface is owned by private entities, while the underlying minerals are administered by the federal government. Facilities located on federal minerals would be permitted by the BLM, while the limited number of facilities located on privately owned (fee) minerals would be permitted with the Colorado Oil and Gas Conservation Commission (COGCC).

1.1 PURPOSE AND NEED FOR ACTION

The purpose of the Proposed Action is to explore, develop, and produce natural gas resources that are present in commercial quantities in geologic formations beneath the surface of the Figure Four Project Area.

Exploration and development of federal oil and gas leases by private industry is an integral part of the oil and gas program of the BLM under authority of the Mineral Leasing Act of 1920 as amended, the Mining and Minerals Policy Act of 1970, the Federal Land Policy and Management Act of 1976, the National Materials and Minerals Policy, Research and Development Act of 1980, and the Federal Onshore Oil and Gas Leasing Reform Act of 1987.

The National Petroleum Council (NPC) was formed in 1946 to advise, inform and make recommendations to the Secretary of Energy (Secretary) on any matter requested by the Secretary relating to oil and natural gas and the oil and natural gas industries. In December 1999, the NPC issued a report titled *Natural Gas: Meeting the Challenges of the Nation's Growing Natural Gas Demand* (NPC 1999). The report projects that U.S. natural gas consumption will increase by 32 percent between 1998 and 2010. This would constitute a seven trillion cubic foot (TCF) increase, from the 1998 level of 22 TCF to 29 TCF in 2010. Much of the incremental demand is projected for use in the generation of electricity.

To meet this growing demand, the report projects that U.S. domestic gas production would increase from the 1998 level of 19 TCF to 25 TCF in 2010. The remaining demand would be met by imports of foreign natural gas, primarily from Canada. About 14 percent of this increase in domestic supply is anticipated to come from the Rocky Mountain region. Production from the Figure Four Natural Gas Project would help meet this demand.

1.2 ISSUE IDENTIFICATION

The National Environmental Policy Act (NEPA) of 1969 requires that an Environmental Assessment or Environmental Impact Statement must be prepared to analyze whether a proposed action would have a significant impact on the environment. The BLM has determined that an Environmental Assessment (EA) would be required prior to permitting the Proposed Action.

Resources considered for the assessment of impacts in this Environmental Assessment include all critical elements of the human environment, which must be addressed in all NEPA documents (BLM 2003):

Air Quality
Areas of Critical Environmental Concern
Cultural Resources
Environmental Justice (E.O. 12898)
Farmlands (prime & unique)
Floodplains
Invasive & Non-native Species
Migratory Birds
Native American Religious Concerns
Threatened & Endangered Species
Hazardous & Solid Wastes
Water Quality (surface & groundwater)
Wetlands & Riparian Zones
Wild & Scenic Rivers (eligible)
Wilderness

Of the 17 critical elements listed above, there are no wilderness areas, wilderness study areas, wild and scenic rivers (or eligible rivers), or prime or unique farmlands in the Figure Four Project Area. In addition, BLM resource specialists in the White River Field Office reviewed EnCana's Proposed Action, as outlined in its Geographic Area Plan (GAP) for the Figure Four Unit, and conferred with other agencies to assess type and magnitude of impacts to the critical elements of the human environment and other resources. Specific issues identified for analysis in this EA include potential:

- Impacts to sage grouse nesting and breeding habitat
- Impacts to raptor nesting sites, breeding, and brood rearing activities
- Impacts to listed threatened, candidate, and BLM sensitive plant species
- Impacts to paleontological/fossil resources
- Surface disturbance on steep slopes and soils vulnerable to high erosion rates
- Project-induced erosion and storm water runoff with associated watershed impacts
- Degradation of water quality in Project Area streams
- Impacts related to use and disposal of hazardous materials and solid waste
- Increased road density in the Project Area that would exceed BLM planning goals

- Impacts to recreation, including hunting, due to project activity
- Impacts related to BLM fire management and fire hazards
- Impacts to plant communities and concerns with noxious weeds/invasive species.

1.3 BLM LAND USE PLANS AND NATURAL GAS LEASING REQUIREMENTS

As indicated earlier in this chapter, Federal lands, including subsurface minerals, in the proposed Project Area are under the jurisdiction of the BLM White River Field Office, and policies for development and land use decisions are contained in the White River ROD/RMP (BLM 1997a). One of the objectives of the White River ROD/RMP is to make the federal lands available for energy development in a manner that provides reasonable protection for other resource values.

A lease does not convey an unlimited right to explore for or an unlimited right to develop any oil or gas resources found under the land. Leases are subject to terms and conditions. These are restrictions derived from legal statutes and measures to minimize adverse impacts to other resources and are generally characterized in a lease as stipulations. Stipulations modify the rights the government grants to a lessee. The stipulations are known by potential lessees before any lease sale and must be applied at the time of Application for Permit to Drill (APD).

The Standard Lease Terms (SLTs) are contained in Form 3100–11, Offer to Lease and Lease for Oil and Gas, United States Department of the Interior, BLM, June 1988 or later addition. The Standard Lease Terms provide the lessee the right to use the leased land as needed to explore for, drill for, extract, remove, and dispose of oil and gas deposits located under the leased lands. Operations must be conducted in a way that minimizes adverse impacts to the land, air, water, cultural, biological, and visual elements of the environment, as well as other land uses or users. In addition to SLTs, surface stipulations, such as No Surface Occupancy, Controlled Surface Occupancy, and Timing Limitations are also applied by the BLM to surface disturbing activities in the White River Field Office area to protect specific resource values. Finally, additional Conditions of Approval may be applied by the BLM to projects to further mitigate impacts, where necessary.

1.4 STATUTES, REGULATIONS, POLICIES & CONSISTENCY WITH PLANS

This EA was prepared in accordance with the National Environmental Policy Act of 1969 (NEPA) and in compliance with all applicable regulations and laws passed subsequently, including Council of Environmental Quality (CEQ) regulations (40 Code of Federal Regulations [C.F.R.], Parts 1500-1508), U.S. Department of the Interior (USDI) requirements (*Department Manual 516, Environmental Quality*), and guidelines listed in BLM *NEPA Handbook, H-1790-1*. This EA also follows guidance included in BLM Handbooks H-8550-1 and the Onshore Oil and Gas Geophysical Exploration Surface Management Requirements.

As part of compliance with Section 106 of the National Historic Preservation Act (38 CFR 800), surveys for cultural resources were carried out for the entire Figure Four Project Area. In addition, consultation with the Northern Ute Tribe was initiated in November 2003. The Tribe will also be provided with copies of this EA for review and comment. A description of the results of the cultural resources surveys and the Section 106 compliance process are provided in Chapters 3.10 and 4.10 of this EA.

Consultation with the U.S. Fish and Wildlife Service was carried out in October and November of 2003 to identify listed, candidate, and other sensitive plant and wildlife species that may occur in the Figure Four Project Area, critical habitat utilized by such species, and potential impacts that may occur as a result of the project in compliance with Section 7 of the Endangered Species Act (50 CFR 402). In addition, similar consultation was carried out with the Colorado Division of Wildlife (CDOW) to identify the occurrence of sensitive wildlife species and potential project impact issues that would be of concern to the state. The results of the Section 7 compliance process and consultation with the CDOW are provided in Chapters 3.7 and 3.8 and 4.7 and 4.8 of this EA.

The Figure Four Project Area lies within both Rio Blanco and Garfield counties and the proposed project is consistent with the planning objectives of those counties, provided applicable permitting requirements are met. In Rio Blanco County, the Figure Four Project Area lies within "Multiple Use" and "Agricultural" zoning districts, which accommodate land uses for numerous purposes including grazing, oil and gas production, logging, hunting, and other diversified purposes. Moreover, EnCana obtained a Special Use Permit License from Rio Blanco County in 2002 to permit its various natural gas projects and facilities in the county. According to the Rio Blanco County Development Department, the Figure Four Project would be authorized by the county under this license, after official notification of the project is submitted to the county by EnCana (Whalin 2003). According to the Garfield County Comprehensive Plan and county Zoning Ordinance, the portion of the Figure Four Project Area that is located within Garfield County lies within "Resource Lands" and "Open Space" land use zones that accommodate resource extraction activities, including oil and gas production. In brief, the project would be consistent with the planning objectives and goals of Garfield County, provided conditional or special use permits are obtained where required and are complied with by EnCana.

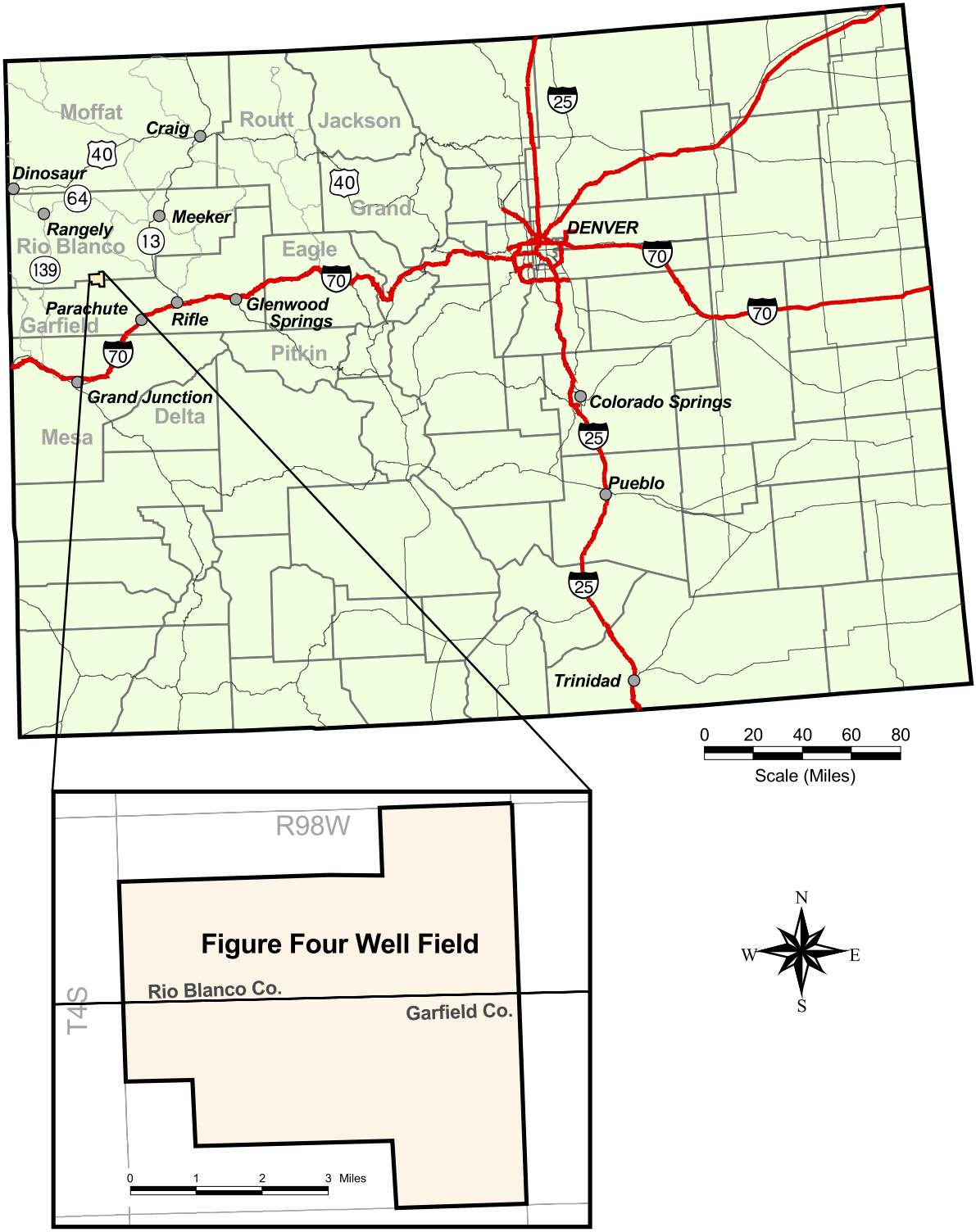


Figure 1-1. General Location of the Figure Four Project Area in Northwest Coloado

2.0 PROPOSED ACTION AND ALTERNATIVES

2.1 INTRODUCTION

EnCana Oil and Gas USA (EnCana) is proposing to develop natural gas resources on its Federal Figure Four Unit, located in Rio Blanco and Garfield Counties in the Piceance Creek Basin in northwestern Colorado. This proposed development follows the previous permitting of thirteen exploratory natural gas wells on federal and private leases within the Figure Four Project Unit. Development of several of these exploratory wells identified economic quantities of natural gas, which resulted in the decision by EnCana to pursue the additional development proposed herein.

For this Environmental Assessment (EA), the Figure Four Project Area (Project Area) includes the proposed natural gas well field within the Figure Four Unit, access roads, the main gas gathering pipeline corridor, and two compressor station sites. Figure 2-1 provides a location map of the Figure Four Project Area. A legal description of the Project Area is as follows:

Proposed Well Field:

Township 4S, Range 98W, Sections 1, 2, 7 - 29, 35, and 36

Main Gas Gathering Pipeline Corridor:

T2S, R97W, Sections 4, 9, 16, 21, 28, 33
T3S, R97W, Sections 4, 8, 9, 17, 19, 20, 30, 31

Compressor Station Sites:

T3S, R98W, Section 36
T3S, R97W, Section 31
T2S, R97W, Section 33

The following sections of the EA present descriptions of the Proposed Action, the No Action alternative, and alternatives considered but eliminated from detailed analysis.

2.2 PROPOSED ACTION

The Proposed Action includes construction and operation of approximately 327 natural gas wells on 120 well pads, approximately 62 miles of access roads (a combination of upgraded existing roads and new roads), approximately 71 miles of gas gathering and produced water pipelines (primarily to be installed in access roadbeds), two compressor stations with a combined capacity of approximately 12,800 horsepower, and gas production and dehydration equipment, water and condensate storage tanks, and other required infrastructure. A map of the Figure Four project layout is provided in Figure 2-2. The map identifies general well pad locations, access road alignments, pipeline routes, and the proposed compressor station sites.

Table 2-1 Identifies Surface disturbance associated with the various components of the Proposed Action.

To accurately define the locations and extent of proposed project features, proposed well pads, access road centerlines, and pipeline routes were surveyed and staked by EnCana. Onsite surveys of these project features were completed by BLM and its third-party environmental contractor in September and October of 2003 to identify environmental resources present and potential areas of concern (vegetative communities and wildlife habitats, archaeological sites, steep slopes, soils present, noxious weed infestations, etc.). Archaeologists, field biologists, and other resource specialists surveyed all proposed facility locations. The results of the onsite surveys were analyzed, and as a means of minimizing or avoiding effects on sensitive habitats and other resources, numerous well pads, access roads and pipelines were relocated. The Proposed Action was therefore developed based on the avoidance of known sensitive habitats and other resources to reduce potential environmental effects.

The Proposed Action would consist of two distinct project phases: construction and operation. Each of these phases would be characterized by different types of activities and potential environmental effects. Each of these project phases is described below.

2.2.1 Project Construction

Construction of well pads, access roads and pipelines, and well drilling and completion would be carried out over an approximately three to four-year period, from 2004 to 2006/2007. Depending on the progress of the drilling program and other factors, this timeframe may extend farther into the future. As wells would be drilled and completed over time, ancillary facilities such as compressor engines, gas dehydration equipment, and condensate tanks would be installed in stages to accommodate the increase in gas production. Given the elevation and generally north-facing aspect of the Project Area, the construction season for the project would generally be the months of March through November, with some variation depending on the arrival and severity of winter. Construction and drilling activities may continue through the winter months at the more-accessible lower elevation locations. Timing limitations intended to protect sensitive wildlife resources could preclude construction activities in certain portions of the Project Area during part of the construction season.

Approximately 175 workers would be needed to construct the proposed well pads, access roads, and gas gathering pipelines and drill and complete the proposed natural gas wells. During this period, it is estimated that construction would add an average of 86 commuter roundtrips per day from communities in the region, such as Meeker, Rifle, Silt, and Rangely. There would also be an estimated 46 roundtrip truck deliveries each day for equipment and supplies.

In general, well pads, access roads, and construction activities would follow guidelines described in the "Gold Book," Surface Operating Standards for Oil and Gas Exploration and

Development (BLM and USFS 1989). Erosion protection and silt retention would be provided by the construction of silt catchments where needed and feasible. All project activities in the area would also follow procedures specified by the BLM as well as other applicable guidelines, including API 1104, "Welding of Pipelines and Related Facilities", dated September 1999, or latest edition.

In locations where tree removal would be required, trees on BLM lands would be purchased by EnCana and then cut to a stump height of no more than 6 inches and cut to 4 foot lengths and stacked off location. Trees on private land would be cut, dozed off, or cleared with a hydro axe from pad locations, roads, and pipeline corridors. Tree limbs and root balls would be placed to the side of constructed surfaces and later scattered back over reclaimed surfaces.

Over the life of the project, EnCana would protect survey monuments, witness corners, reference monuments, and all other survey points against disturbance. Should survey points be unintentionally disturbed by project-related construction activity, EnCana would immediately notify the BLM and secure a registered land surveyor to restore the disturbed survey points.

As discussed in subsequent sections of this EA, if archaeological or historic artifacts or vertebrate fossil materials are discovered during the course of construction activities, EnCana would suspend all operations that would further disturb these materials and immediately contact the BLM. Operations in the area of discovery would not resume until written authorization to proceed has been issued by the BLM Authorized Officer.

The following is a description of the various project components that would be constructed as part of the Proposed Action.

2.2.1.1 Natural Gas Well Pads and Production Equipment

The construction of natural gas well pads and installation of production equipment would commence in the summer of 2004 and continue through the end of 2006/2007, depending on the progress of the drilling program, successful gas production from completed wells, weather conditions, and other factors. After each well is drilled and completed, natural gas production would last an estimated 20 to 30 years. Removal of surface production equipment and reclamation of well pads would immediately follow the end of economic gas production at each location.

To ensure that safe and adequate working space for drilling and well completion, and to accommodate multiple wells, well pads would be constructed to provide a working surface of approximately 3.0 acres on average. With necessary cuts and fills, total surface disturbance per pad would average approximately 4.25 acres. Since the number of wells per pad may vary to some extent depending on where natural gas is found and cut and fill areas would vary depending on site-specific topography, well pad size and cut and fill disturbance would also vary. During the project construction phase, 120 well pads would be constructed on approximately 510 acres of the 17,385-acre surface area of the Project Area. Each completed well pad would contain flowing wellhead(s), a meter house, a separator, produced

water/condensate tanks, and associated piping. Multiple wells would be drilled on individual pads to reduce the number of well pads and related surface disturbance required.

Well pad construction would utilize standard cut and fill methods using native rock and soil materials. Construction of each individual pad would take approximately 2 to 3 weeks and would utilize diesel-fired heavy equipment such as dozers, back hoes, and graders. As a first step, an average minimum of 6 inches of topsoil would be scalped from the area to be disturbed and stockpiled for future reclamation. Cut and fill construction would basically involve removal of subsoil and rock from higher spots on the pad site and placing that material on the lower spots to provide a level pad surface. Fill material would be compacted to provide greater pad and slope stability.

Following the drilling and completion of wells on each pad, interim reclamation would be carried out to revegetate the portion of the well pad not needed for long-term natural gas production. To accomplish interim reclamation, cut and fill slopes around the perimeter of the well pads would be covered with topsoil and would be seeded with a certified noxious weed free seed mix in the Fall after construction to promote revegetation of these disturbed areas. On the well pad, interim reclamation would be carried out on the portion of the pad not needed for operations. It is estimated that about 2 acres of the total 4.25 acre disturbance area (on average) of each pad would be reclaimed; leaving approximately 2.25-acres of long-term surface disturbance per pad that would remain over the life of the project. The amount of pad surface and cut and fill slopes that would undergo interim reclamation would vary by location due to differences in the size of cut and fill slopes and working surface required over the long-term. In total, out of the 510 acres of short-term disturbance associated with construction of 120 well pads, about 240 acres would undergo interim reclamation, leaving about 270 acres of long-term surface disturbance.

Prior to well drilling, a reserve pit(s) and a flare pit would be constructed on each pad. The reserve pits would be approximately 12 feet deep with 2 feet of freeboard, and would vary in size depending on the number of wells that would be drilled on each pad. The reserve pits would include pit liners, consisting of 16-mil woven polyethylene plastic, to prevent seepage or discharge of drilling fluids. To assure stability, the reserve pits would be constructed on the cut side of the pads and would not be constructed in a natural drainage, where flood hazards exist, or where surface runoff could enter the pits and damage the pit walls. Reserve pits would be fenced on three sides with 3-strand barbed wire for safety reasons. Reserve pit fence corners would be constructed to BLM specifications. Reserve pits would be netted with small mesh in Sage Grouse habitat areas.

The fourth side of the reserve pits would be fenced following removal of the drill rig and would remain fenced until the liquids are removed and the pit is backfilled. Any hydrocarbons in the reserve pits would be removed as soon as possible after drilling operations are completed. The production (flare) pits would be 8 feet in diameter, 8 feet deep. Pits would be used for well testing and flaring during well completion. Figure 2-3 provides a cross-sectional view of a typical Figure Four well pad, with cut and fill diagrams.

Figure 2-4 provide plan view illustrations of typical well pad configurations that would be utilized for the Figure Four Project.

Wellheads, metering and instrumentation sheds, dehydrators, separators, and other ancillary equipment that would be installed on the well pads would be painted a flat, non-reflective natural earth tone color to visually blend in with the surrounding landscape, unless prohibited by OSHA regulations. All production equipment and tanks that would contain produced fluid hydrocarbons would be installed within diked or bermed areas designed to contain at least 110 percent of the largest tank or vessel. This dike would be independent of (would not utilize) the back cut on the pad.

2.2.1.2 Well Drilling and Completion

Well drilling and completion would utilize assorted diesel-fired heavy equipment and support facilities. Equipment that would be transported to each well pad and utilized for drilling and completion includes a drill rig rated to 12,000' of depth, a boiler, generator, air compressor and booster, mud tanks, pump house, diesel fuel storage tanks, propane tanks, pipe racks, trash cage or dumpster, and a driller's trailer, portable toilet, and potable water tank. Approximated, 46 trucks trips per day are anticipated for transport of equipment and deliveries to the active portions of the well field. Well drilling personnel would either commute to the site daily from communities in the region or be housed in trailers on the well pads. Figure 2-5 provides an illustration of the typical equipment layout on a well pad during drilling.

Approximately 120 of the 327 proposed gas wells would be developed using traditional vertical drilling methods (about one per pad), while the remaining 207 or so wells would utilize directional drilling techniques. Directional drilling multiple wells from individual pads has been proposed to reduce the overall number of pads, and to reduce short-term and long-term surface disturbance within the Project Area. The proposed drilling program for the Figure Four Project would utilize 1 to 3 drill rigs in 2004, and as many as 5 rigs in 2005 and later years, assuming favorable gas production from the earliest wells justifies full development of the Proposed Action. Geologic targets for the Figure Four Project are primarily located in the Williams Fork Formation of the Mesaverde Group.

Drilling of individual wells would commence following Application for Permit to Drill (APD) approval and submittal of a Spud Notice to the BLM. All usable water (<10,000 ppm TDS) and prospectively valuable minerals encountered during drilling would be recorded by depth and adequately protected using casing, cementing, or other appropriate isolation. Surface pipe would be cemented from the depth set to ground level. Well casing, cementing, and pressure control equipment would all be installed to meet or exceed American Petroleum Institute (API) and any other applicable standards. No abnormal temperatures or pressures are anticipated. No hydrogen sulfide has been encountered or is known to exist from previous drilling in the area at the proposed drilling depths.

Wells would utilize an open-loop circulation system with pits. The pits would be constructed and operated as specified in the APD. Any hydrocarbons which entered the pits would be removed as soon as possible after drilling operations were completed. Following drilling operations, drilling fluids would normally be recovered and reused at the next drilling location. Cuttings generated during the drilling process would be buried in the reserve pit following the removal of any excess liquids.

After the completion of drilling operations, any well containing producing formations would be logged, and production casing would be run and cemented in accordance with the drilling program approved in the APD. This would isolate all formations in the hole and would effectively eliminate communication between hydrocarbon-bearing zones and water aquifers or other mineral resources. All oil and gas shows would be tested to determine commercial potential, unless such potential has been shown to be non-commercial in offset wells.

After the production casing is set, a completion unit would move on site to begin completion operations. The casing would be perforated in potentially productive zones down hole and the well would be tested for initial production rates. If necessary, the producing formation would be hydraulically fractured in the designated productive zones. This would be accomplished by pumping a mixture of sand proppant and gelled water down the well bore under pressure, through the perforations in the casing, and into the formation. As the formation fractures, the resulting space would be filled with the sand proppant to keep the fractures open and facilitate the flow of gas to the well bore. All liquids produced during completion operations would be placed in production tanks, temporary storage tanks, or frac tanks as appropriate. These liquids would be reused at a subsequent well completion or disposed of in an approved waste disposal facility within 90 days after initial production.

As individual gas bearing zones are completed, gas would be vented and flared until all residual completion fluids are purged from the well. Well venting and flaring are expected to occur over an average of 3 days during the completion process for each gas producing zone.

Spills of oil, gas, salt water, potentially hazardous substances, or other fluids, blowouts, fires, leaks, accidents or any other unusual occurrences during drilling and completion would immediately be reported to the BLM, and any other regulatory agencies necessary. Strict cleanup efforts would be initiated immediately. This would be true at all stages of the project including drilling, completion, operation, and well abandonment.

Immediately after removal of the drilling and completion rigs, all debris, trash, and other waste materials would be removed from the well pad. Open pits would be properly maintained and remain fenced until pit closure is completed.

Any dry holes would be plugged immediately, and the well pads, associated roads, and other facilities would be reclaimed as soon as possible after plugging to minimize erosion.

2.2.1.3 Access Road

The primary access routes into the Figure Four Project Area would be Rio Blanco County Roads 5 and 69 and Hunter Creek Road, which is a private road. County Road 5 is a paved road and would not require any upgrades for the Proposed Action. County Road 69 and Hunter Creek Road were previously upgraded to serve EnCana's existing gas wells in the area and no additional upgrades to these roads would be required. To service the proposed natural gas well field, approximately 62 miles of access roads would be required. Approximately 17.3 miles of existing roads would be upgraded, while about 44.9 miles of new roads would be constructed in the proposed well field, assuming full development of the Proposed Action. Construction of proposed access roads and installation of co-located gas gathering and produced water pipelines would utilize a 50-foot right-of-way and would result in approximately 330.9 acres of surface disturbance in the well field. Upon completion of access road construction and co-located gas and water pipeline installation, interim reclamation of 20 feet of the construction ROW would take place, leaving 30-foot wide access roads that would remain over the life of the project. Interim reclamation would result in the revegetation of approximately 129.9 acres of disturbance. Total long-term disturbance associated with access roads in the well field would be about 201 acres.

In general, all Project Area access roads would be constructed to meet the standards of anticipated traffic flow and all-weather requirements. For access road construction within the field, surfacing materials would consist primarily of native soils, with pit run gravel to be utilized at various locations where necessary. Construction would include crowning, ditching, sloping, and dipping, and turnouts as necessary to provide a well-constructed safe road. Runoff would be diverted from access roads by means of cutouts to reduce erosion of the roadway and drainage ditches. Road grades would average 10 percent or less and would only exceed 10 percent in areas where physical terrain or unusual circumstances require it. Road drainage crossings would be typical of dry creek crossings and would be designed so they would not cause siltation, the accumulation of debris, nor physically block the drainage channel. In some locations along access roads, the BLM has required that EnCana install gates or cattle guards to prevent unauthorized motorized access and livestock from crossing from one property or grazing allotment to another.

Access roads would be constructed using heavy equipment including dozers, graders, backhoes, water trucks, and dump trucks. The proposed access roads would be built within a 50-foot wide construction right-of-way (ROW) that would also include buried gas gathering and water pipelines. Interim reclamation of the temporarily disturbed construction ROW would consist of ripping and then seeding with an appropriate certified noxious weed free seed mix to ensure revegetation. The reclaimed disturbed areas along roads would be inspected no less than three times between May and October on a yearly basis for problems with erosion and/or noxious weed infestation and repaired or treated as necessary to address these problems.

Prior to construction and/or upgrading of access roads, road ROWs would be cleared of snow and allowed to dry completely. If snow removal from access roads is required, equipment

used for snow removal operations would be equipped with shoes to keep the blade 3-inches off the road surface. Special precautions would be taken where the surface of the ground is uneven and at drainage crossings to ensure that equipment blades do not destroy vegetation. Road construction or upgrading would not occur during muddy conditions, and all developed mud holes would be filled, to prevent the use of detours outside of the road ROW. To reduce fugitive dust during the project construction phase, EnCana would treat access roads with either magnesium chloride or periodic road watering.

Virtually all project roads would be constructed between 2004 and 2006 to provide access to all 120 well pads. Use of the roads would occur over the life of the project until the end of gas production. In some cases, dry holes may be drilled or the gas resources may be considered unproductive. Roads to pads deemed unproductive would be recontoured, closed, and revegetated immediately after plugging and abandonment of unproductive wells, and closure and reclamation of associated pads.

In terms of ongoing road maintenance, all access roads would be maintained in a safe and legal condition in accordance with their original construction standards throughout their operational life. Existing roads would be maintained by EnCana in as good or better condition than they were prior to project construction. To promote revegetation and minimize environmental effects over the long-term, company vehicles and contractors would be prohibited from traveling outside of the permitted 30-foot access road ROW over the life of the project. Trash and litter along access roads would be collected and properly disposed of by EnCana or its contractor on a regular basis.

2.2.1.4 Gas Gathering and Water Pipelines

Gas gathering pipelines would be constructed to connect the proposed gas wells to a sales point at the north end of the Project Area. Gathering pipelines would be 8 inches in diameter and would be constructed within access road ROWs to minimize surface disturbance. These gathering lines would feed into various intermediate lateral pipelines ranging from 10 to 16 inches in diameter, and then into a main gas gathering pipeline that would be up to 20 inches in diameter. The main trunk pipeline would be constructed down the Hunter Creek Valley to the proposed compressor stations. The discharge pipeline from the compressor stations would proceed north to the sales point at a major transmission pipeline located along Piceance Creek about 2 miles north of Rock School. Gas gathering pipelines would be buried at a depth of 3 feet, except under road crossings, where they would be buried at a depth of 4 feet. A network of 6-inch water pipelines would be installed adjacent to the gas gathering pipeline system for delivery of water for drilling and transportation of produced water out of the well field during gas production. These water pipelines would be co-located in the same trench as the gas gathering pipelines.

In total, approximately 71 miles of gas gathering and co-located water pipelines would be installed as part of the Proposed Action. Within the well field, 58.4 miles of pipelines would be installed. Of this, 53.6 miles would be installed within access road ROWs to minimize surface disturbance, while approximately 4.8 miles would be installed outside of roadbeds,

resulting in 34.6 acres of additional short-term surface disturbance. To reduce surface disturbance, gas gathering pipeline laterals outside of roadways that would descend steep terrain would be installed on the surface, rather than underground. The main gas gathering pipeline would be approximately 12.4 miles long and would be installed adjacent to Hunter Creek Road for a distance of about 6.9 miles to the proposed lower compressor station. From there, the main gathering pipeline would be installed within the previously disturbed ROW of the TransColorado Pipeline and proceed about 5.5 miles north to its terminus at the proposed gas sales point. Since widening of the Hunter Creek Road ROW up to 20 feet would be required in various locations to accommodate the main gas gathering and co-located water pipeline, approximately 16.7 acres of additional surface disturbance would be required. Where pipelines would cross fence lines, the fences would be replaced following completion of construction or cattleguards would be installed to prevent undesired movement of livestock across property lines or grazing allotments. Temporary fencing would be installed to ensure allotment/pasture integrity during the construction phase of the project.

Equipment needed to lay the gas gathering and water pipeline network would include trucks and flat bed trailers for stringing, a bending machine, welding rigs, sidebooms, backhoes, and pick-up trucks. All of these types of equipment may be present on Project Area roads as each step of the construction process is completed. Vehicle traffic during the construction phase would include truck trips for transportation of the pipe and related fittings and other components, delivery of heavy equipment, the daily commuting of the workforce, and the daily operation of the construction equipment (about 6 heavy truck roundtrips and 3 light truck roundtrips per day).

Following installation of the gas gathering pipeline network, EnCana would condition pipeline ROWs in a manner to preclude vehicular travel, except for access to pipeline condensate drip collection and valve locations. Reclamation of the disturbed construction corridors outside of road beds would occur in the fall at the end of the construction season. The disturbed pipeline surfaces would be seeded with grasses and shrub species as required by the BLM and the surface owners. These reclaimed pipeline corridors would be monitored over the operational life of the project for issues including erosion and noxious weed infestation. If these issues arise, they will be repaired and/or treated as required by the BLM to minimize environmental effects. Pipeline markers identifying their locations would be installed within 90 days after construction is completed.

2.2.1.5 Compression, Gas Dehydration, Condensate, and Produced Water Management

As mentioned previously, all gas produced by the Figure Four Project would be transported via an up to 20-inch main gas gathering pipeline to two new compressor stations located in series in Section 31, T3S, R97W and Section 33, T2S, R97W in the Hunter Creek Valley. These two stations, the Upper Hunter Creek and Lower Hunter Creek Compressors, would be equipped with a combined total of approximately 12,800 horsepower (HP) of compression (a total of about six compressor engines). These compressor stations would be installed to deliver gas from the proposed wells to the sales point on the regional transmission pipeline

located near Piceance Creek. Construction of the two compressor stations would require the disturbance of approximately nine acres. Compressor installation would be staged over the construction period, starting with approximately 6,400 HP in 2004. Additional units would be added over time as gas production increased, to achieve a total capacity of approximately 12,800 HP. While the first few compressor engines would be smaller and not be housed within buildings, both compressor stations would likely utilize fully enclosed metal buildings to house the larger compressor engines at full build out envisioned under the Proposed Action. To reduce noise emissions, all compressor engines that would be utilized by the proposed project would be equipped with hospital-type mufflers.

Since some of the proposed project would utilize a "wet" gas gathering system, dehydration of the gas would occur at the Upper Hunter Creek Compressor Station. This centralized dehydration unit would have a burner rating of approximately 1.25 million BTU per hour (MMBTU/hr).

Natural gas liquids, or condensate, would be collected at various drip locations along the gas gathering pipeline system. Condensate would be collected in tanks and periodically removed by tanker trucks to commercial points outside of the Figure Four Project Area for further processing and sale. Condensate tanks would be painted a natural earth tone color selected by the BLM to visually blend in with the surrounding landscape.

As mentioned previously, produced water would be used for well drilling or piped from the well pads to a 6-inch water pipeline extending down the Hunter Creek Valley to one of the proposed compressor stations, where it would be loaded into trucks and hauled to an appropriate disposal facility, consisting of either an existing permitted injection well or evaporation ponds. The hauling of produced water would generate an estimated 5 truck roundtrips per day on the Hunter Creek Road.

2.2.1.6 Water Source and Consumption

Water would be used by the project in drilling and completing wells and watering roads for dust control. Water would be obtained from a combination of sources, including Piceance Creek (when available), irrigation water presently owned by EnCana that would be converted to industrial use, and possibly water diverted from the White River and delivered to the Figure Four Project Area by truck. Water would be transported to individual well sites by the proposed 6-inch water pipeline network described above, that would extend up the Hunter Creek Valley from the Piceance Creek Valley. A maximum of 125 acre-feet of water per year would be used for drilling, completion, dust control and other miscellaneous activities during the construction and drilling phase of the project. Produced water and completion fluids would be utilized or recycled as feasible for drilling and completion on subsequent wells to reduce the project's demand for fresh water.

Should EnCana choose to accelerate the drilling of gas wells in the future, and utilize more than 125-acre feet of water per year for drilling, EnCana would utilize senior water rights already accounted for by the U.S. Fish and Wildlife Service as a historic depletion of the

White River system. Alternatively, in the event EnCana would utilize water that would be considered a new depletion of the White River system above the BLM-authorized 125-acre feet limit, additional coordination with the BLM and consultation with the U.S. Fish and Wildlife Service would be carried out to assess potential effects on sensitive fish species in the White River system.

After drilling and completion of the proposed gas wells, substantially less water would be used over the 20 to 30 year operations phase life of the project. Water use would likely drop to less than 10 acre-feet per year.

2.2.1.7 Sanitation and Waste Disposal

Trash containers and portable toilets would be located on active construction and drilling sites during well pad, access road, and pipeline construction, as well as during well drilling and completion operations. Toilet holding tanks would be regularly pumped and their contents disposed of at the Meeker, Colorado municipal sewage facility in accordance with applicable rules and regulations regarding sewage treatment and disposal.

Accumulated trash and nonflammable waste materials would be hauled to the Rio Blanco County landfill once a week or as often as necessary. Solid waste and trash would not be burned onsite or placed in the reserve pit. All debris and waste materials not contained in the trash containers would be cleaned up, removed from the Project Area, and disposed of at the Rio Blanco County landfill. Cleanup would occur every day. No potentially harmful materials or substances would be left in the Project Area or vicinity. Scrap metal and other recyclable refuse would be hauled to the EnCana equipment yard in Rifle, Colorado on a regular basis.

Spills of oil, gas, salt water, or potentially hazardous substances would immediately be reported to BLM and any other regulatory agencies as necessary. Spilled materials would be cleaned up immediately and sent to an approved disposal site.

2.2.2 Project Operation

The operations phase of the Figure Four Project is estimated to be 20 to 30 years for economically producing gas wells in the Project Area. The operations phase of the project would be characterized by a substantial reduction in human activity in the Project Area. Vehicle traffic would also diminish to about 20 roundtrips per day for condensate hauling, produced water hauling, periodic maintenance, and well workovers and deliveries.

As mentioned previously, each completed well pad would contain at least one wellhead, a production separator, dehydrator, storage tanks to contain water and condensate, and a metering and instrumentation shed. The number of each of these facilities would correspond to the number of wells producing on each pad. These facilities would remain operational in the Project Area over the life of the project. Produced natural gas would be treated on the well pad to remove liquids, metered, and then transported via gathering pipelines to the main

gathering pipeline in the Hunter Creek Valley, where it would be compressed and transported to the sales point at the north end of the Project Area along Piceance Creek.

Water produced during the operations phase of the project would be piped to a truck loading point at one of the compressor stations in the Hunter Creek Valley. It is estimated that 5 truck loads of produced water per day would be hauled from the truck loading point down the Hunter Creek Road, as described previously in Section 2.2.1.5.

Condensate would be stored in collection tanks and transported by tanker trucks to commercial processing facilities outside the Figure Four Project Area. It is estimated that one truck trip per well per month would be required for condensate transport. If all of the proposed 327 wells were drilled and produced gas, this would equate to approximately 11 truck trips per day for condensate hauling.

At a minimum, an EnCana or contract pumper would visit and inspect all constructed wells on a weekly basis. Maintenance visits would occur over the life of the project for routine scheduled service or when problems are identified. It is estimated that three crews would inspect and maintain the Figure Four well field on a full-time basis over the life of the project. These crews would utilize light pick up trucks, and would generate three vehicle trips in and out of the Project Area on a daily basis. Well workovers may be required over the operations phase of the project, which would involve the use of heavier equipment and additional worker visits. It is assumed that one additional vehicle trip per day would be generated by periodic workovers and deliveries to the Project Area.

Due to winter snow conditions and as a means of reducing well visits, the well field would be equipped with remote instrumentation so metered gas production can be monitored remotely. The use of remote telemetry would reduce the number of well visits/inspections from one per day to one or two per week. Unless a problem is identified in the well field, operations and maintenance activities are expected to be minimal. During winter months, well maintenance visits and inspections would utilize snowmobiles over the majority of the Project Area.

2.2.3 Summary of Project Area Disturbance

In total, construction of the proposed well pads, access roads, and pipelines would result in the short-term disturbance (lasting the construction phase of the project or until interim and final reclamation are successful) of approximately 901.2 acres of the 17,384.5-acre surface area of the Figure Four Project Area. Following interim reclamation of approximately 421.2 acres of temporarily disturbed areas, long-term surface disturbance (lasting the 20 to 30 year operational life of the project) would amount to approximately 480.0 acres. Short-term disturbance, interim reclamation, and long-term surface disturbance that would occur as a result of the Proposed Action are presented in Table 2-1.

Table 2-1. Short and Long-term Surface Disturbance Estimates for the Proposed Action in the Figure Four Project Area

Disturbance Source	Short Term Disturbance (3-4 Years)	Interim Reclamation	Remaining Long Term Disturbance (20-30 Years)
Well Pads	510.0 acres	240.0 acres	270.0 acres
Access Roads & Co-Located Buried Pipelines	330.9 acres	129.9 acres	201.0 acres
Pipelines outside of Road ROWs	34.6 acres	34.6 acres	0.0 acres
Hunter Creek Main Gathering Pipeline	16.7 acres	16.7 acres	0.0 acres
Compressors	9.0 acres	0.0 acres	9.0 acres
Total Disturbance	**901.2 acres**	**421.2 acres**	**480.0 acres**

Minor ephemeral drainages would be crossed by roads and pipelines in a few limited locations. Piceance Creek and Hunter Creek, the only perennial streams potentially impacted by the Proposed Action, would be crossed by the proposed main gas gathering pipeline using open cut construction methods. The construction of project facilities across streams or wetlands areas would be permitted by the U.S. Army Corps of Engineers, approved by the BLM, and would comply with permit conditions, before construction begins.

2.2.4 Surface Reclamation

Following well completion at each well pad, the pad and adjacent areas would be cleared of all debris, spoil materials, trash, junk, and other wastes not required for production.

On the well pads, the reserve pits and the portion of the pads not needed for production would be reclaimed within 90 days from the date of final completion of the last well on each pad, weather permitting. Following well completion, any hydrocarbons in the reserve pit would be removed in accordance with applicable regulations. Before earthmoving work to reclaim the reserve pit is started, the reserve pit would be completely dry and all cans, barrels, pipe, etc. would be removed. The pit liners would then be cut off at the top of the drill cuttings and disposed of off site. The pits would then be back filled.

EnCana would maintain the access roads as necessary to prevent soil erosion, and accommodate year-round traffic. Disturbed areas along access roads not required for production and all buried pipeline corridors would be recontoured and revegetated using a BLM-approved certified noxious weed-free seed mixture. Certified seed generally meets this requirement.

During reclamation, the seedbed would be prepared by disking and roller packing following the natural contours. Fall seeding would be completed after September 1, and prior to prolonged ground frost. Spring seeding would be completed after the post-frost and prior to

May 15. Seed would be drilled on roller packed contours at a depth of no greater than one half inch (½"). In areas that can not be drilled, seed would be broadcast at double the drill seeding rate and harrowed into the soil. Perennial vegetation would be established over time and additional work would be carried out by EnCana or its contractor in the event of revegetation failure.

For wells that are considered to be non-producers, or when economic wells reach the end of their productive lives, EnCana would restore the pads and access roads to their original contours. Unless requested otherwise by the BLM, access roads would be closed to future vehicle traffic through contouring and filling, and possibly by the placement of berms or topographic barriers to prevent vehicle use. During reclamation, fill material would be pushed back into cuts, and no depressions would be left that would trap water. Topsoil would be distributed evenly over the reclaimed location and revegetated with a BLM-approved certified noxious weed-free seed mixture.

2.2.5 Surface Stipulations and Conditions of Approval

Surface stipulations have been identified by BLM for all surface disturbing activities within the White River Field Office area, as identified in the White River ROD/RMP. Surface stipulations are divided into three general categories (BLM 1997a):

- No Surface Occupancy (NSO) stipulations, which are intended to close an entire area to surface disturbance and to the placement of facilities.
- Timing Limitations (TL) stipulations, which limit the types of activities that can occur during specific months of the year.
- Controlled Surface Use (CSU) stipulations, which require that special development plans are submitted and approved before authorization is granted.

Most surface stipulations can be excepted, modified, or waived by the Field Office Manager if the decision is documented through an environmental analysis. An exception would suspend the applicable stipulation on a one-time basis. Modifications would temporarily or permanently change the language or provision of a stipulation. Waivers are utilized to permanently exempt the stipulation due to changed circumstances (BLM 1997a).

EnCana would implement the policies/practices necessary to comply with the surface stipulations to minimize negative environmental effects to vegetation, including special status species; minimize the spread of noxious and problem weeds; and minimize negative effects to grazing resources and wetlands. The BLM stipulations protecting those resources discussed are as follows:

- NSO-02 Surface occupancy or disturbance will not be allowed within ¼ mile of nests of special status raptors, including listed, proposed, or candidate species for listing under the Endangered Species Act and BLM Sensitive Species.

- NSO-03 Surface occupancy will not be allowed within 1/8 mile of nests of other than special status raptors.
- NSO-04 Surface occupancy will not be allowed within 1/4 mile of identified sage grouse lek sites.
- NSO-06 Surface occupancy or disturbance will not be allowed within the boundaries of the ACEC (including the Dudley Bluffs and Ryan Gulch ACECs).
- NSO-08 No surface occupancy will be allowed on mapped populations of habitat for listed and candidate T/E plant species.
- NSO-09 No surface occupancy will be allowed on mapped populations of areas containing BLM sensitive plants and remnant vegetation associations.
- CSU-01 Surface disturbing activities will be allowed in areas with fragile soils on slopes greater than 35% and saline soils derived from Mancos shale only after an engineered construction/reclamation plan is submitted by the operator and approved by the Field Office Manager.
- TL-01 No development activities are allowed within 1/2 mile of identified raptor nest sites of listed, proposed, candidate species, and BLM sensitive species from February 1 through August 15, or until fledging and dispersal of young.
- TL-04 No development activities are allowed within 1/4 mile of identified raptor nest sites of other than special status raptor species from February 1 through August 15, or until fledging and dispersal of young.
- TL-06 Development activity will not be allowed in sage grouse nesting habitat within 2 miles of identified leks from April 15 to July 7 if direct and indirect impacts to suitable nesting habitat exceed 10 percent of the habitat available to that lek.
- TL-08 No development activity is allowed in big game severe winter range from December 1 to April 30.
- TL-09 Development activity will not be allowed in deer and elk summer range from May 15 to August 15 if direct and indirect impacts to summer range exceeds 10 percent of summer habitat available in that respective Game Management Unit (GMU).

In addition to the surface stipulations, the BLM has identified Conditions of Approval (COAs) as a further means of avoiding or minimizing environmental effects from BLM-authorized projects and management actions. COAs have been identified generally for surface disturbing activities in the White River Field Office Area, and are described in the current White River ROD/ RMP (BLM 1997a). Examples of COAs identified in the White River ROD/ RMP are as follows:

- Surface disturbing activities would be required to avoid riparian/wetland habitat.
- If the installation of a bridge would result in the discharge of soil into water, a permit must be obtained from the U.S. Army Corps of Engineers according to Section 404 of the Clean Water Act of 1977.
- All fluid storage tanks shall have a dike constructed around the tank of sufficient capacity to adequately contain at least 110 percent of the storage capacity of the tank.

Tank batteries shall have a dike capable of adequately containing 110 percent of the largest tank.

- Right-of-ways will use areas adjoining or adjacent to previously disturbed areas whenever possible, rather than traverse undisturbed communities.
- Cuts, fills, and excavations shall be dressed and blended with surroundings. Pipelines will be buried where possible. Vegetation will be planted on disturbed areas.
- All seed planted or sowed in BLM weed-free zones, for any purpose, shall be certified by a qualified federal, state or county officer as free of noxious weed seed.
- All hay, straw, mulch or other vegetative material used in weed-free zones for site stability, rehabilitation or project facilitation shall be certified by a qualified federal, state or county officer as free of noxious weeds and noxious weed seed. Current state standards shall be applicable.
- All contractors and land-use operators moving surface disturbing equipment into the weed free zones must clean their equipment prior to use on BLM lands.

2.2.6 Federally Required Environmental Protection Measures

The following list summarizes various required practices that would be implemented by EnCana to avoid or minimize potential negative effects on the various resources present in the Project Area, based on federal lease stipulations in the Figure Four Unit. All of the locations identified in the following sections are found in Township 4S, Range 98W.

2.2.6.1 Sensitive Plant Species

In order to prevent adverse effects to rare and sensitive plant populations, a field survey would be carried out in areas where ground disturbance is proposed in Section 4 – lot 4; Section 8 – E/2 of the SE¼; Section 14 – N/2, E/2 of the SE¼; Section 35 – All; Section 36 – All.

2.2.6.2 Wildlife Protection

Big Game – If the BLM determines that effects to big game summer range would exceed 10% of that available in the Game Management Unit, a timing limitation restricting drilling to the August 16 through May 14 timeframe would be implemented in Section 19 – All; Section 24 – SW¼, S/2 of the SE¼, N/2 of the SW¼; Section 25 – All; Section 28 – All; Section 29 – All; Section 35 – All; Section 36 All. Exceptions may be granted.

Raptors – No development would occur within ¼ mile of occupied raptor nests from February 1 through August 15 or until fledging and dispersal of young; development would occur from August 16 through January 31 in Section 24 - W/2 of the NE¼, and Section 13 – SE ¼ of the SE¼. Similarly, if raptor nests are found, pads or roads would not be constructed within 1/8 mile in Section 24 – E/2 of the NE¼. Exceptions may be granted.

Sage Grouse – If the BLM has determined that direct and indirect effects to sage grouse suitable nesting cover has exceeded 10 percent of the habitat available within 2 miles of

identified leks, development would be limited to July 8 through April 14 in Section 4 – lot 4; Section 12 – N/2 of the S/2, SW¼ of the SW¼, S/2 of the SE¼; Section 14 – E/2 of the NE¼, SE¼ of the SW¼, SE/4; Section 23 – All; Section 24 – All; Section 25 – All; Section 35 – NE¼ of the NE¼; Section 36 – N/2. Exceptions may be granted.

2.2.6.3 Soils

Where pads or roads are proposed on or near fragile soils in the following areas, a plan to protect those soils would be submitted with the APD and implemented as required by the Authorized Officer: Section 1 – lot 2, SW¼ of the NE¼, SW/4; Section 2 – lot 2, SE¼ of the SE¼, SE¼ of the NW¼, N/2 of the SW¼; Section 10 – N/2 of the NE¼, W/2 of the NW¼; Section 11 – SE/4; Section 12 – All; Section 22 – N/2 of the NE¼, SW¼ of the SW¼; Section 23 – All; Section 24 – All; Section 25 – All. Exceptions may be granted.

2.2.6.4 Visual Resources

All surface facilities would be painted a natural earth tone color selected by the BLM to reduce visual contrast, unless prohibited by OSHA regulations.

2.2.6.5 Cultural Resources

A Class III cultural resources inventory of the proposed well pads, access roads, and other facilities on federal lands would be conducted and a report filed with the BLM. Should any significant cultural resources be located during project construction, EnCana would suspend all operations that could further disturb the find and immediately contact the BLM. EnCana's contract archaeologist would notify the BLM and make recommendations for impact avoidance. Operations in the area of the discovery would not resume until written authorization to proceed has been received from the BLM Authorized Officer.

2.2.6.6 Paleontological Resources

On-site paleontological surveys would be conducted in areas with exposed bedrock or shallow soils before ground-disturbing activities (roads, pipelines, well sites, staging areas, etc.). Should significant fossil resources be located, EnCana would suspend all operations that could further disturb the find and immediately contact the BLM. EnCana's contract paleontologist would make site-specific recommendations for impact avoidance. Operations in the area of the discovery would not resume until written authorization to proceed has been received from the BLM Authorized Officer.

2.3 NO ACTION ALTERNATIVE

Under the No Action alternative, EnCana's Geographic Area Plan (GAP) would not be approved and the Proposed Action would not be implemented. Apart from the previously permitted federal wells, natural gas resources in the Figure Four Unit would only be developed on privately-owned (fee) minerals leased or owned by EnCana. Current land use practices and resource trends on BLM surface lands, including the development of the

previously approved thirteen well locations would continue. If additional future natural gas development were proposed within the Figure Four Unit to develop federal minerals, those actions would be subject to a separate analysis under NEPA.

Under the No Action alternative, approximately 6 well pads with approximately 18 gas wells would be constructed on fee surface lands. Access road construction would consist of upgrading approximately 2.5 miles of existing primitive two-track roads and about 3.5 miles of new roads to serve fee wells. Access roads would cross a combination of private and BLM-administered surfaces.

All gas gathering pipelines associated with the No Action alternative would be co-located with existing roadways. All produced gas would be transported outside the Figure Four Unit via pipelines that would serve existing fee wells in the area.

With this smaller-scale development, additional compression would not be required and the 20-inch Hunter Creek main gas gathering pipeline would not be built. Surface disturbance that would be required under the No Action alternative is summarized below in Table 2-2.

Table 2-2. Short and Long-term Surface Disturbance Estimates for the No Action Alternative in the Figure Four Project Area

Disturbance Source	Short Term Disturbance (3-4 Years)	Interim Reclamation	Remaining Long Term Disturbance (20-30 Years)
Well Pads	25.5 acres	12.0 acres	13.5 acres
Access Roads & Co-located Buried Pipelines	32.7 acres	14.5 acres	18.2 acres
Total Disturbance	58.2 acres	26.5 acres	31.7 acres

2.4 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS

2.4.1 Original Company Proposed Project

In September 2003, EnCana provided the BLM its Geographic Area Plan (GAP) for the Figure Four Project. The original proposed project, as described in the GAP, included specifically staked locations for well pads, roads, and gathering pipeline corridors. As described previously in Section 2.1, to assess potential effects from the project as envisioned in the GAP, a technical team of BLM resource specialists and contracted environmental scientists visited all of the company-proposed facility locations in the field. These on-site field surveys revealed the potential for effects to wildlife and other resources. Examples of potential effects that were of concern to the BLM included:

- Disturbance of aspen groves that provide valuable nesting habitat for raptors and cover for big game and other wildlife species;
- Disturbance of prime breeding habitat for greater sage grouse;
- Construction of duplicative or redundant access roads that would unnecessarily add surface disturbance to the Project Area; and
- Construction of access roads that could not be easily closed to unauthorized off-road vehicle (ORV) use, or successfully reclaimed to prevent future ORV use.

Of the well pad sites originally evaluated, 20 of the pads and/or their corresponding access roads were relocated entirely due to the potential for avoidable adverse effects to vegetation, wildlife or other resources. In addition, 32 of the pad sites and/or access roads were shifted in location or orientation to reduce potential effects to nearby sensitive habitats. Given the large number of project changes required to reduce potential environmental effects, the original project, as proposed by EnCana, has been eliminated from further consideration in favor of the Proposed Action, which incorporates all the changes recommended by the BLM to avoid or reduce these potential environmental effects.

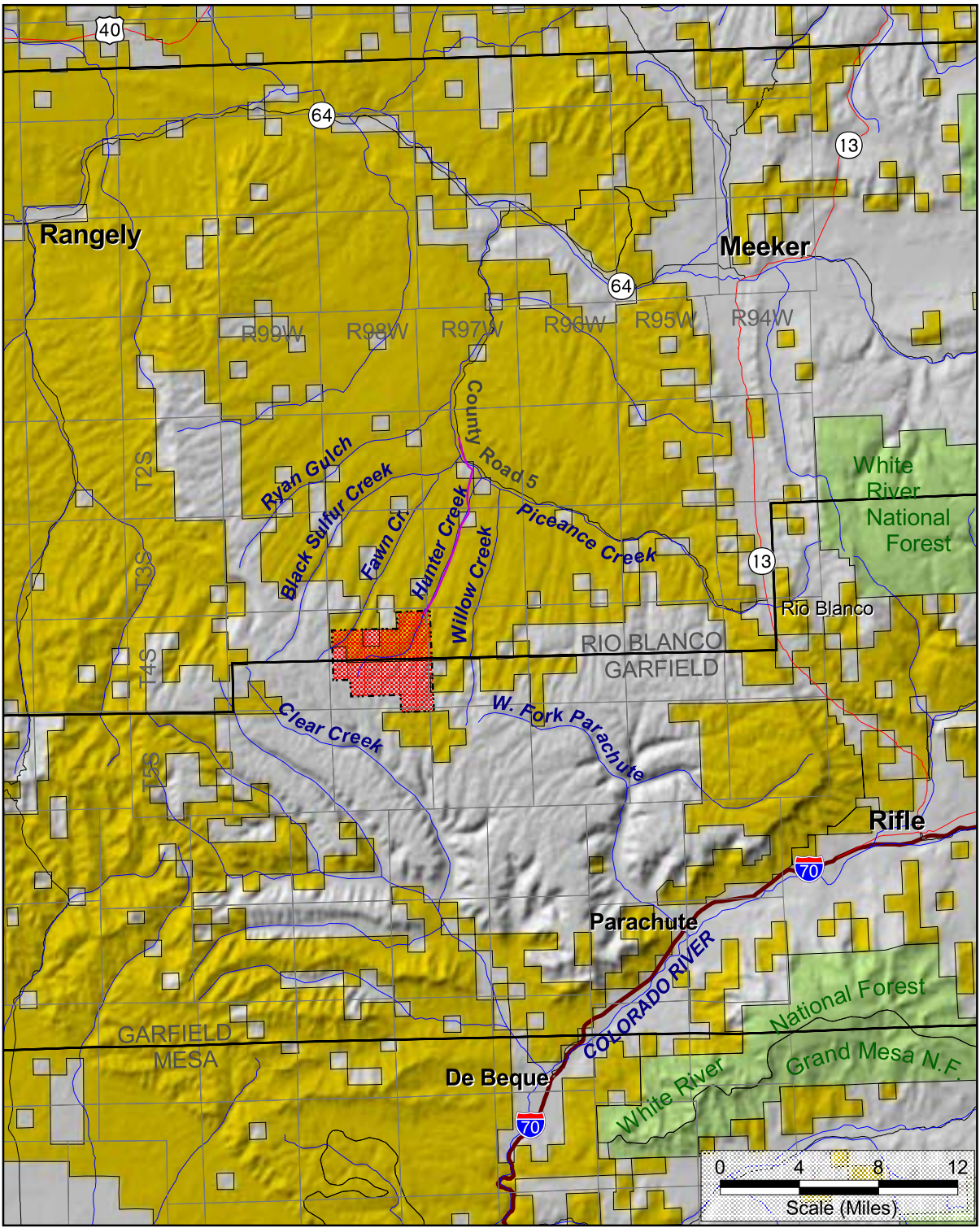


Figure 2-1. Location Map of the Figure Four Project Area

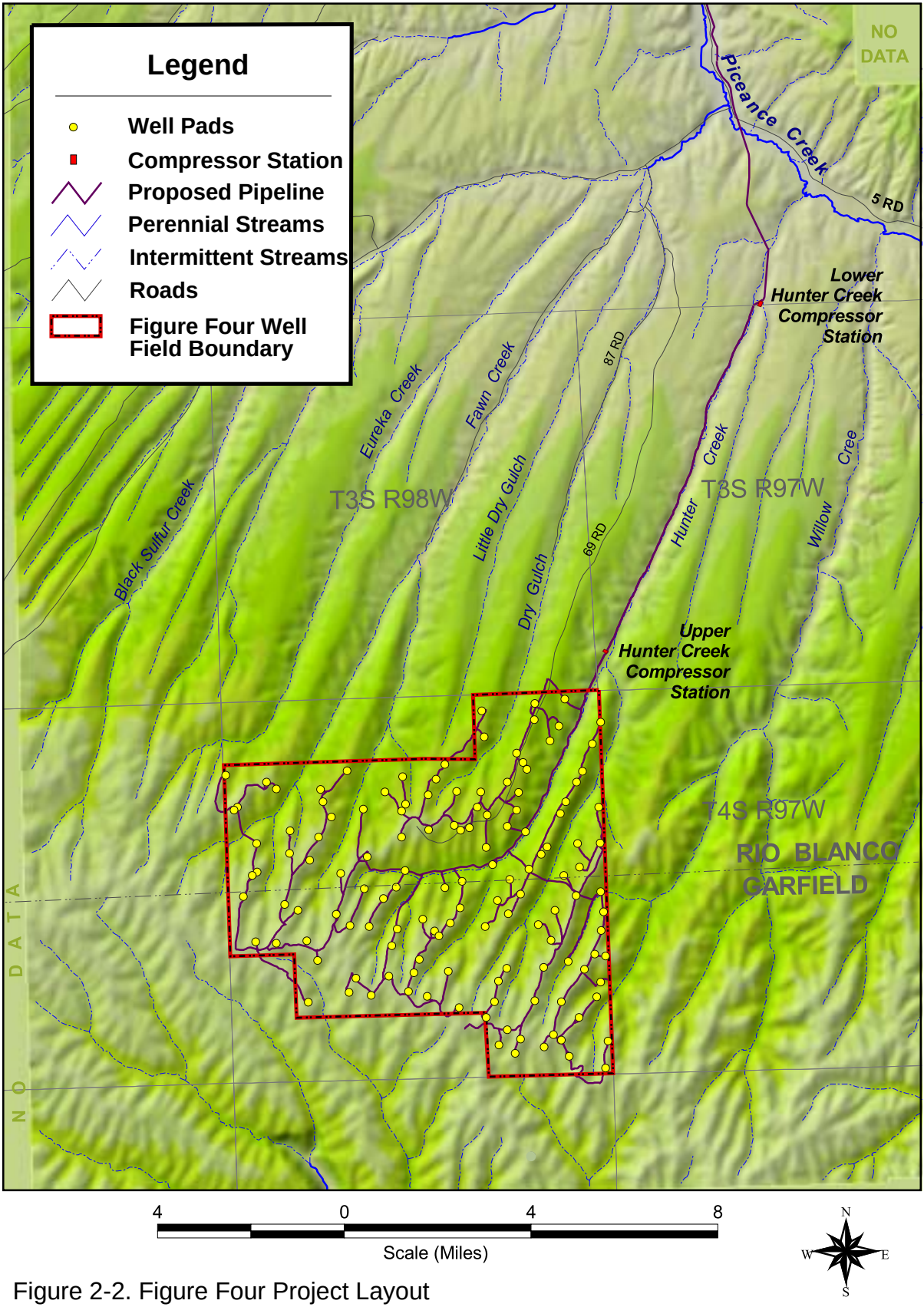


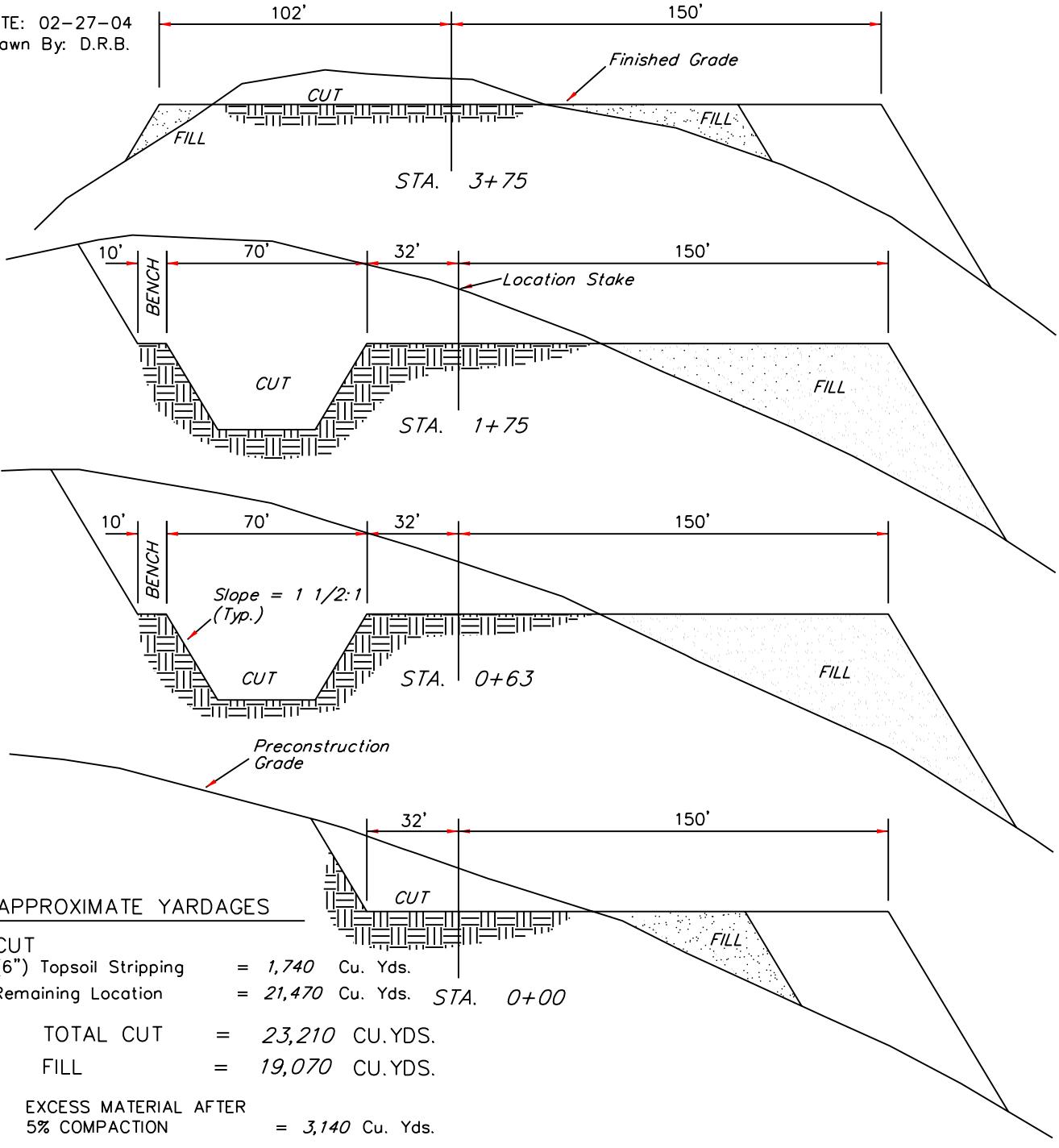
Figure 2-2. Figure Four Project Layout

EnCana OIL & GAS (USA) INC.

TYPICAL CROSS SECTIONS FOR

PAD #30
SECTION 11, T4S, R98W, 6th P.M.
SW 1/4 SW 1/4

DATE: 02-27-04
Drawn By: D.R.B.



APPROXIMATE YARDAGES

CUT
(6") Topsoil Stripping = 1,740 Cu. Yds.
Remaining Location = 21,470 Cu. Yds.

TOTAL CUT = 23,210 CU.YDS.
FILL = 19,070 CU.YDS.

EXCESS MATERIAL AFTER
5% COMPACTION = 3,140 Cu. Yds.

Topsoil & Pit Backfill = 3,140 Cu. Yds.
(1/2 Pit Vol.)

EXCESS UNBALANCE = 0 Cu. Yds.
(After Rehabilitation)

FIGURE FOUR NATURAL GAS PROJECT ENVIRONMENTAL ASSESSMENT

FIGURE 2-3. CROSS SECTIONAL VIEW OF A TYPICAL WELL PAD WITH CUT AND FILL

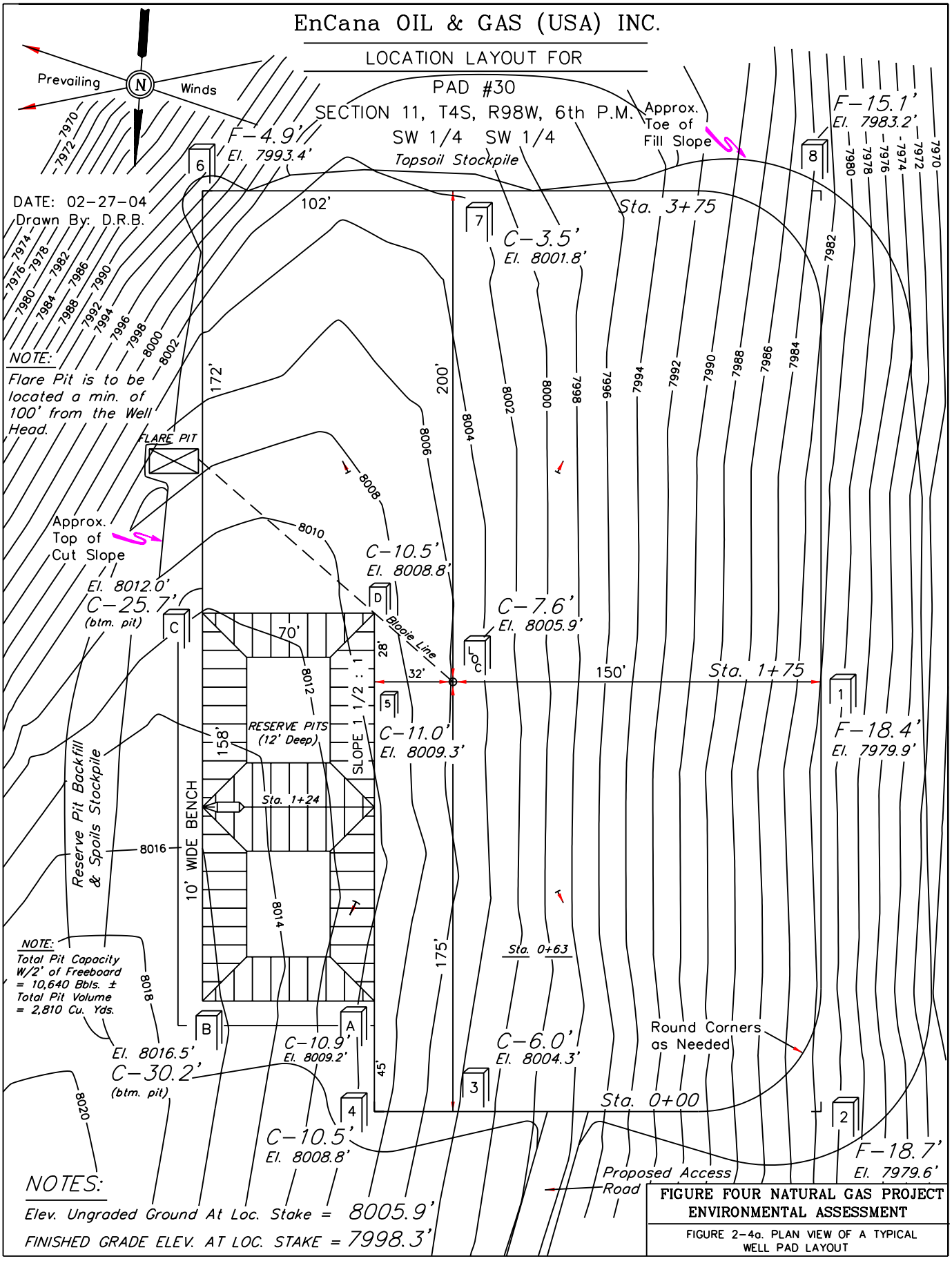
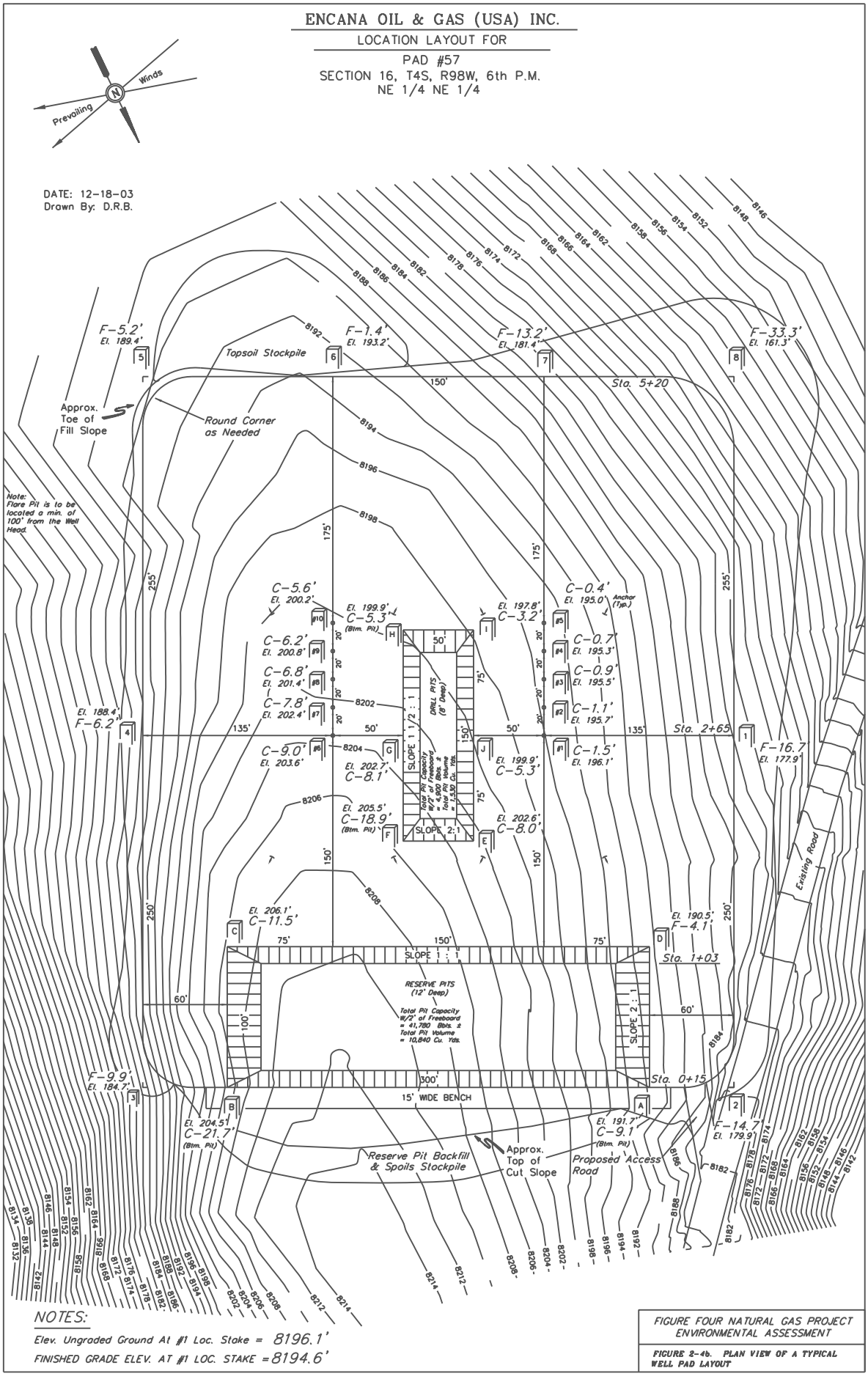
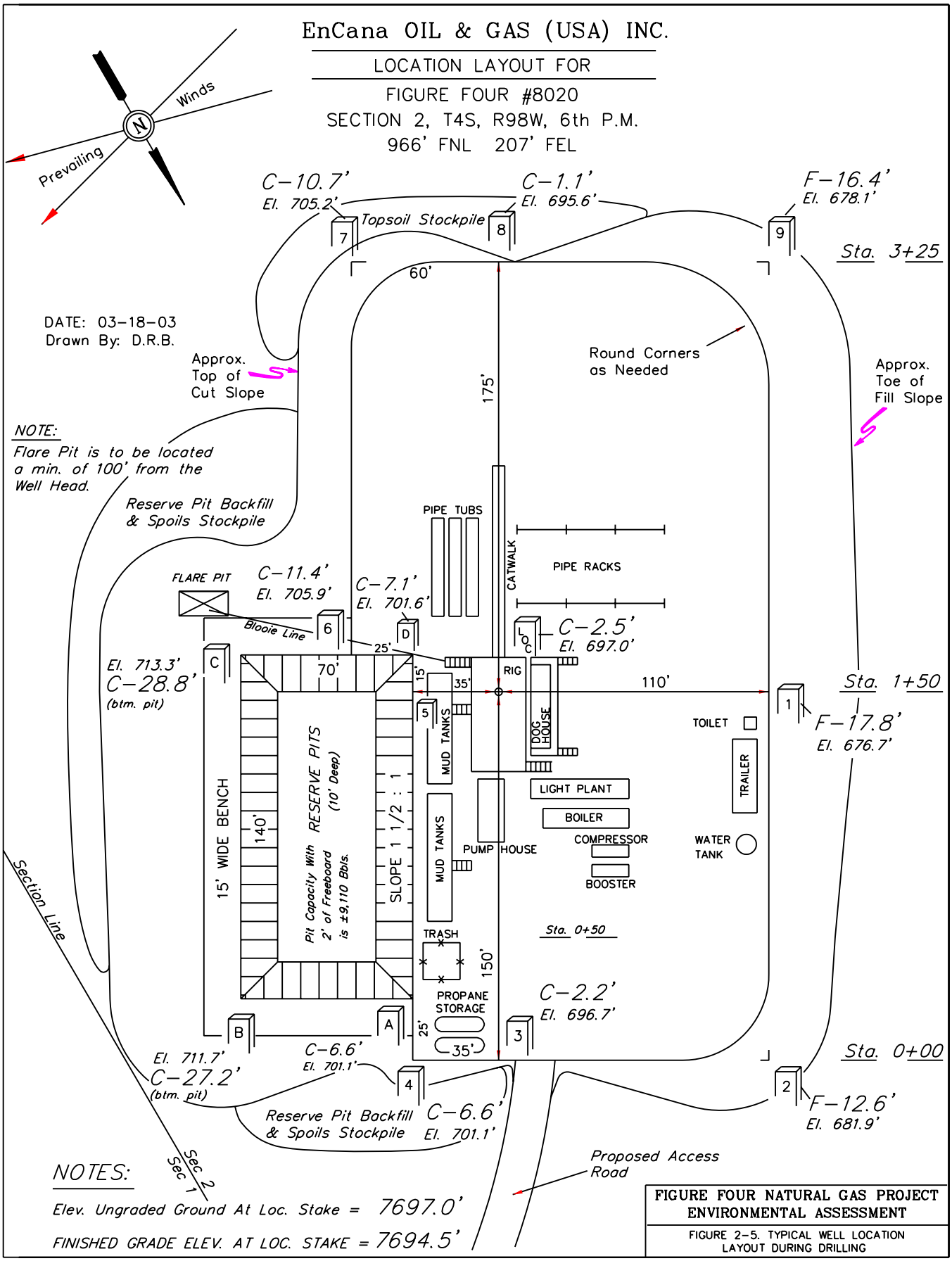
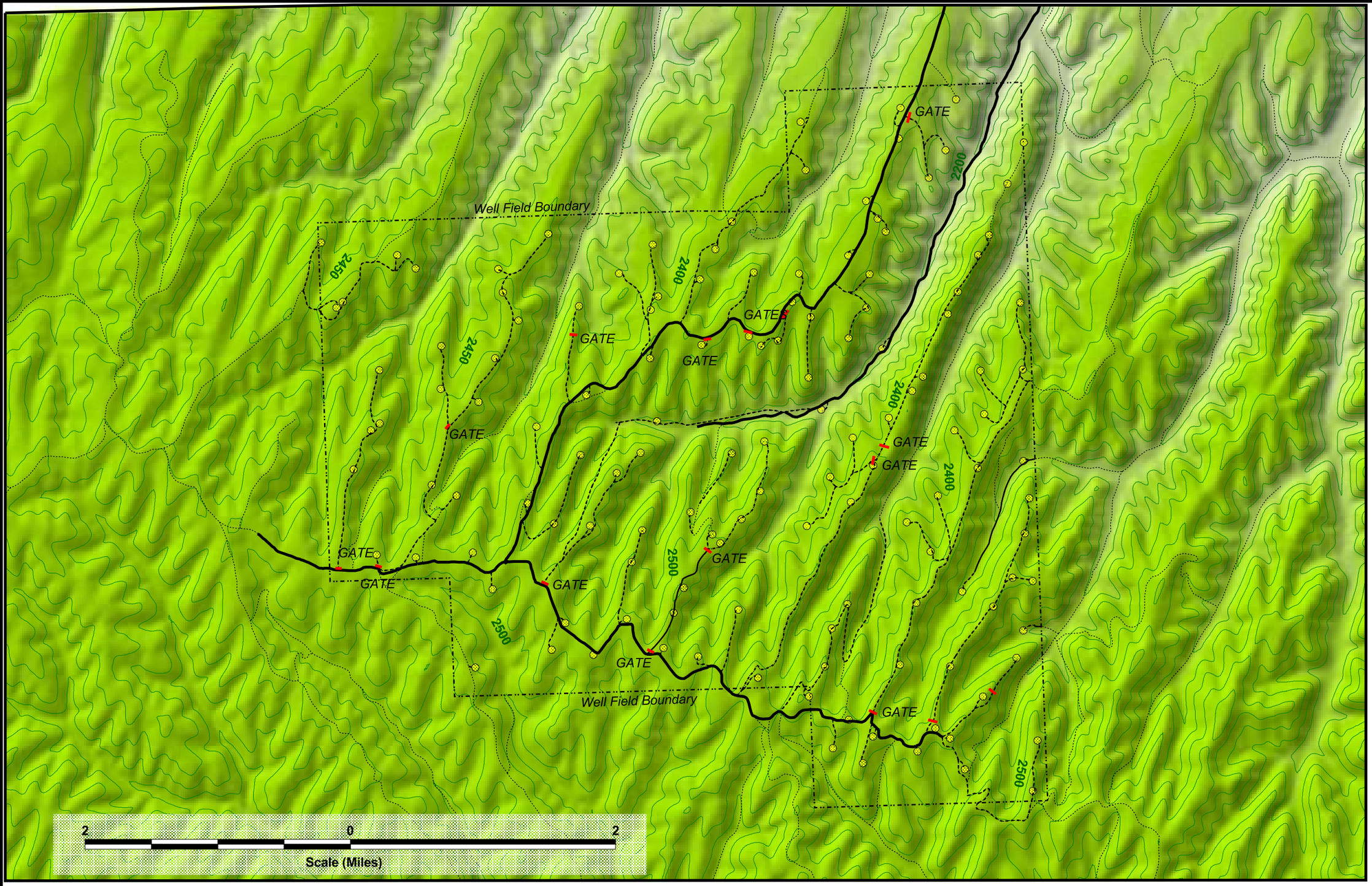


FIGURE FOUR NATURAL GAS PROJECT
ENVIRONMENTAL ASSESSMENT

FIGURE 2-4a. PLAN VIEW OF A TYPICAL WELL PAD LAYOUT


ENCANA OIL & GAS (USA) INC.
LOCATION LAYOUT FOR
PAD #57
SECTION 16, T4S, R98W, 6th P.M.
NE 1/4 NE 1/4
Prevailing Winds
DATE: 12-18-03
Drawn By: D.R.B.
Topsoil Stockpile
Approx. Toe of Fill Slope
Round Corner as Needed
Note: Flare Pit is to be located a min. of 100' from the Well Head.
Sta. 5+20
Sta. 2+65
Sta. 1+03
Sta. 0+15
F-5.2' El. 189.4'
F-1.4' El. 193.2'
F-13.2' El. 181.4'
F-33.3' El. 161.3'
F-6.2' El. 188.4'
F-16.7' El. 177.9'
F-4.1' El. 190.5'
F-14.7' El. 179.9'
F-9.9' El. 184.7'
C-5.6' El. 200.2'
C-6.2' El. 200.8'
C-6.8' El. 201.4'
C-7.8' El. 202.4'
C-9.0' El. 203.6'
C-5.3' El. 199.9' (Btm. Pit)
C-8.1' El. 202.7'
C-18.9' El. 205.5' (Btm. Pit)
C-11.5' El. 206.1'
C-21.7' El. 204.5' (Btm. Pit)
C-3.2' El. 197.8'
C-5.3' El. 199.9'
C-8.0' El. 202.6'
C-0.4' El. 195.0'
C-0.7' El. 195.3'
C-0.9' El. 195.5'
C-1.1' El. 195.7'
C-1.5' El. 196.1'
C-9.1' El. 191.7' (Btm. Pit)
Anchor (Typ.)
DRILL PITS (8' Deep)
Total Pit Capacity W/2' of Freeboard = 4,400 Bbls. ± Total Pit Volume = 1,530 Cu. Yds.
RESERVE PITS (12' Deep)
Total Pit Capacity W/2' of Freeboard = 41,780 Bbls. ± Total Pit Volume = 10,840 Cu. Yds.
SLOPE 1 1/2 : 1
SLOPE 2 : 1
15' WIDE BENCH
Reserve Pit Backfill & Spoils Stockpile
Approx. Top of Cut Slope
Proposed Access Road
Existing Road
NOTES:
Elev. Ungraded Ground At #1 Loc. Stake = 8196.1'
FINISHED GRADE ELEV. AT #1 LOC. STAKE = 8194.6'
FIGURE FOUR NATURAL GAS PROJECT
ENVIRONMENTAL ASSESSMENT
FIGURE 2-4b. PLAN VIEW OF A TYPICAL WELL PAD LAYOUT


EnCana OIL & GAS (USA) INC.
LOCATION LAYOUT FOR
FIGURE FOUR #8020
SECTION 2, T4S, R98W, 6th P.M.
966' FNL 207' FEL
Winds
Prevailing
N
C-10.7'
El. 705.2'
C-1.1'
El. 695.6'
F-16.4'
El. 678.1'
Topsoil Stockpile
Sta. 3+25
60'
DATE: 03-18-03
Drawn By: D.R.B.
Approx. Top of Cut Slope
Round Corners as Needed
Approx. Toe of Fill Slope
175'
NOTE:
Flare Pit is to be located a min. of 100' from the Well Head.
Reserve Pit Backfill & Spoils Stockpile
PIPE TUBS
CATWALK
PIPE RACKS
FLARE PIT
C-11.4'
El. 705.9'
C-7.1'
El. 701.6'
Blooie Line
25'
C-2.5'
El. 697.0'
El. 713.3'
C-28.8'
(btm. pit)
70'
15'
35'
RIG
110'
Sta. 1+50
F-17.8'
El. 676.7'
TOILET
MUD TANKS
DOG HOUSE
TRAILER
LIGHT PLANT
BOILER
15' WIDE BENCH
140'
RESERVE PITS (10' Deep)
Pit Capacity With 2' of Freeboard is ±9,110 Bbls.
SLOPE 1 1/2 : 1
MUD TANKS
PUMP HOUSE
COMPRESSOR
BOOSTER
WATER TANK
Section Line
Sta. 0+50
TRASH
150'
PROPANE STORAGE
C-2.2'
El. 696.7'
25'
35'
El. 711.7'
C-27.2'
(btm. pit)
C-6.6'
El. 701.1'
Sta. 0+00
F-12.6'
El. 681.9'
Reserve Pit Backfill & Spoils Stockpile
C-6.6'
El. 701.1'
Sec 2
Sec 1
Proposed Access Road
NOTES:
Elev. Ungraded Ground At Loc. Stake = 7697.0'
FINISHED GRADE ELEV. AT LOC. STAKE = 7694.5'
FIGURE FOUR NATURAL GAS PROJECT
ENVIRONMENTAL ASSESSMENT
FIGURE 2-5. TYPICAL WELL LOCATION LAYOUT DURING DRILLING



Proposed Figure Four Access Road Network

- Existing main access road (no upgrade necessary)
- Existing roads to be upgraded
- New access roads
- Existing Roads
- Proposed gate locations
- Proposed Well Pad Locations

50 meter contour intervals

Figure 2-6. Proposed Figure Four Access Road Network

3.0 AFFECTED ENVIRONMENT

To evaluate the potential for impacts resulting from the Proposed Action or other alternatives described in Chapter 2.0, it is necessary to identify the current environmental conditions or affected environment within the Project Area and surrounding region. In general, the Figure Four Project Area includes the proposed approximately 17,300-acre well field area, the proposed Hunter Creek pipeline corridor from the well field north to the proposed CIG sales point near Piceance Creek, and the road network that would be used to access the proposed well field and related facilities (CR 69, Hunter Creek Road, Willow Creek Road, etc.). For some resources, such as air quality and socioeconomics, the potentially affected area is larger than the Project Area defined above. In those cases, a broader geographic area is identified and potentially affected resources are discussed, as appropriate.

3.1 GEOLOGY AND MINERAL RESOURCES

3.1.1 Physiography and Topography

The Project Area is located within the northern province of the Piceance Basin (the portion of the basin that is north of I-70). The entire Piceance Basin has an areal extent of approximately 1,600 square miles and covers parts of Moffat, Rio Blanco, Garfield, Mesa, Delta, Pitkin, and Gunnison Counties. As shown on Figure 3-1, the northern province of the Piceance Basin is bordered by the Grand Hogback to the east, the Roan Plateau and Roan Cliffs to the south, Skinner Ridge to the southwest, the Cathedral Bluffs and Calamity Ridge to the west, and the White River to the north. The major topographic feature within the basin is the dissected Roan Plateau standing as much as 3,000 feet above the adjacent lowlands. The northern portion of the basin has been eroded into a topographic basin by the drainages of the Yellow and Piceance Creeks, which are tributaries to the White River.

Surface elevations within the Piceance Basin range from about 5,705 feet above mean sea level (amsl) at the confluence of Piceance Creek and the White River to over 8,500 feet on the Roan Plateau. The topography in the Project Area consists of parallel ridges and valleys with local relief ranging from about 200 to 600 feet (Weeks et al. 1974).

3.1.2 Structural Geology

The Piceance Basin is a broad, asymmetric, southeast-northwest trending structural basin consisting of a series of alternating anticlines and synclines. The deepest part of the basin is associated with the Red Wash Syncline, which parallels the northern boundary of the basin, and the South Rangely Syncline. The two synclines are separated by the broad Rangely Anticline.

Deposition of sediments into this region began with the downwarping of the basin floor in the Cretaceous Era and continued into Eocene time. Low stream gradients and moderate uplift of the marginal mountains prevented significant erosion of the basin's perimeter. This

sequence of events resulted in the creation of the Wasatch, Green River, and Uinta Formations in and around a series of landlocked lakes (Tweto 1980).

Numerous lineations associated with joints, fractures, normal faults, and grabens are present in the northern portion of the Piceance Basin. The largest of the grabens is the Dudley Bluffs fault system, located just north of the Project Area.

The Project Area is located in the transitional area between the Piceance Basin axis to the east and the Douglas Creek Arch to the west. Strata within the Project Area dip an average of 6° to the east.

3.1.3 Stratigraphy

The Piceance Basin contains stratified sediments ranging in age from Cambrian through middle Tertiary. The northern half of the basin is deepest and has the thickest stratigraphic sequence. The overall thickness of sediments is about 24,000 feet in the center of the basin. Figure 3-2 presents the hydrostratigraphic column for the Piceance Basin.

Tertiary sedimentary deposits within the basin are about 8,000 feet thick and consist of the Uinta, Green River, and Wasatch Formations. The Uinta Formation outcrops throughout much of the basin and covers much of the surface of the Project Area, especially on the ridge tops. The Uinta Formation consists of sandstones with interlayered sequences of siltstones and marly siltstones. The sandstones are massive, usually devoid of visible stratification, and generally fine- to medium-grained. The interbedded siltstones and marly siltstones tend to be tabular with indistinct stratification. The Uinta Formation exceeds 1,400 feet in thickness near the center of the basin.

The Green River Formation is divided into four members: the Parachute Creek, Garden Gulch, Douglas Creek, and Anvil Points Members. In addition, rock units referred to as the Tongues of the Green River Formation are interfingered with the lower part of the Uinta Formation. The Green River Formation is about 2,000 feet thick near the center of the basin and conformably overlies the Wasatch Formation. The Parachute Creek Member is the uppermost unit of the Green River Formation and consists of marlstone and lean to rich oil shale, some of which contains nahcolite and halite. The Parachute Creek Member contains virtually all of the oil shale, nahcolite, and dawsonite resources in the Piceance Basin.

The Wasatch Formation reaches a maximum thickness of about 5,500 feet. In the southern portion of the basin, the Wasatch Formation is subdivided into the Shire, Molina, and Atwell Gulch Members. The Shire Member contains variegated siltstone, claystone, and sandstones. The Molina Member is dominated by massive, cross-bedded sandstone. The basal Atwell Gulch Member is composed of variegated siltstone and claystone. The base of the Tertiary section is composed of a thin conglomerate known as the Fort Union Formation.

These Tertiary rocks unconformably overlie the Cretaceous Mesaverde Group, which includes the Fox Hills Sandstone, Lewis Shale, and Williams Fork Formation. The Mesaverde Group is composed of mudstones and sandstones with coal beds and ranges in

thickness from about 3,000 to over 7,000 feet. These rocks were deposited during periods of sea level regression within the Cretaceous interior seaway. The Williams Fork Formation is the primary target for hydrocarbon production beneath the Project Area.

Quaternary alluvium is present in the floor of the major valleys within the Project Area and consists of unconsolidated sand, gravel, and clay derived primarily from the Uinta Formation. These deposits range from near zero to about 140 feet thick (Robson and Saulnier 1981). The alluvium is highly permeable and is locally an important aquifer in the stream valleys, except where thick clay deposits exist (Weeks et al. 1974).

3.1.4 Mineral Resources

Mineral resources within the Piceance Basin include oil and gas deposits, major deposits of oil shale, the world's largest deposits of natural sodium bicarbonate (nahcolite), and minor amounts of sand and gravel.

3.1.4.1 Oil and Gas

Oil and gas deposits are found throughout the Piceance Basin, and the entire area is considered to be a potential resource. Oil and gas production is from both structural and stratigraphic traps. Currently, oil production occurs primarily from four fields located on the edges of the Piceance Basin: the Rangely, Wilson Creek, Winter Valley, and Elk Springs Fields, and within the basin itself. The Rangley Field has been the most productive oil field in Colorado for many years. At Rangely, oil is produced from the Weber Sandstone, Salt Wash Sandstone, Morrison Formation, and Mancos Shale. Lesser amounts of oil have also been produced from the Piceance Basin itself. Oil production from the Rangely, Wilson Creek, Winter Valley, and Elk Springs Fields has declined in recent years.

Gas production occurs from the Rangely and Wilson Creek Fields, and also from the Douglas Creek Arch, where there are currently 28 fields producing gas from eight intervals. Most of the gas reservoirs also produce varying amounts of oil/gas condensate.

Within the Figure Four Project Area, there are thirteen existing or permitted EnCana well locations that are presently under development. These wells were permitted prior to this Environmental Assessment and the impacts of that development were covered under separate environmental analyses.

3.1.4.2 Oil Shale

The Green River Formation in the Piceance Basin contains an estimated 1,200 to 1,800 billion barrels of shale oil (BLM 1994; Robson and Saulnier 1981). The Parachute Creek Member of the Green River Formation contains the majority of the oil shale resource, and the upper Garden Gulch Member also contains some kerogen-bearing rock. The Parachute Creek Member is 900-1,200 feet thick at the southern and western margins of the basin and about 1,900 feet thick in the center of the depositional center of the basin, north of the Project

Area. The richest oil shale interval is referred to as the Mahogany Zone. This zone is 100-200 feet thick and extends to all margins of the basin.

The Project Area is identified in the White River ROD/RMP as available for oil shale leasing (BLM 1997a). Attempted development of the oil shale occurred at two lease tracts within the basin in the 1970s and 1980s. Tract C-a was located to the northwest of the Project Area along tributaries to Yellow Creek, and Tract C-b was located just east of the Project Area near Willow Creek. Both lease tracts attempted to recover oil from the Mahogany Zone using a combination of conventional mining methods and in-situ or above-ground retorting of the shale. No mining method to date has provided a viable method to economically extract oil from shale. Nevertheless, oil shale is regarded as a valuable potential resource for the future.

3.1.4.3 Sodium

The Project Area is located south of the area underlain by the Saline Zone and therefore would not affect development of sodium resources.

3.1.4.4 Salable Minerals

Limited amounts of salable minerals are located within the Project Area. These minerals include sand, gravel, and sandstone. Sand and gravel are found in Quaternary alluvial deposits located along the stream valleys. Sandstone is quarried from the Uinta Formation. These materials are used for road construction and maintenance in the basin.

Potential building stone and rip-rap material are located throughout the Project Area. Nearly all resistant rock formations are considered to be a potential source of stone and rip-rap. Low-grade asphalt and tar deposits are also present in thin and discontinuous layers between sandstone beds of the Green River Formation. However, these deposits are not considered to be economically viable (BLM 1994).

3.2 PALEONTOLOGY

Fossils, including invertebrates such as insects and ammonites, and a wide variety of vertebrates such as fish, reptiles, dinosaurs, and mammals, are known to occur within the Piceance Basin (BLM 1994). Many fossil plants also exist within the area. The majority of these fossils have been recovered from the Uinta Formation and the Parachute Creek Member of the Green River Formation. Under BLM's current classification system, all vertebrate fossils are considered to be scientifically significant.

In the Project Area, the Parachute Creek Member of the Green River Formation and the Uinta Formation are considered to be Class 1 formations. In addition, some fossil localities within the Piceance Basin are considered to be Class 1 fossil localities.

3.3 SOILS

Soils in the Piceance Basin occupy varying landforms including narrow valleys, rolling hills, and steep-sided ridges. The semi-arid environment has retarded soil development. Lack of moisture, cool nights, and infrequent high temperatures have suppressed vegetation growth and slowed the chemical and biological processes needed for good soil development (BLM 1994).

Soils in some areas of the Piceance Basin are high in sodium and other salts. These soils generally support a sparse vegetation cover of salt-tolerant shrubs, grasses, and lichens. Runoff from these soils transports salt in solution and sediments containing salts that go rapidly into solution when they reach a waterway. Soils that are highly susceptible to water erosion are also present within the Project Area. The surface of these soils generally has a high portion of fine materials with little organic matter, which leads to little infiltration and rapid runoff.

Detailed maps of the soils that cover the Project Area are contained within the following documents:

- Soil Survey of Rio Blanco County Area, Colorado (USDA 1982), Sheets 30, 43, and 52
- Soil Survey of Douglas-Plateau Area, Colorado, Parts of Garfield and Mesa Counties (USDA 2003), Sheets 6 and 7

The soil map units within the Project Area are described in Table 3-1. Figure 3-3 provides a map of the soil types that occur in the Project Area, with the proposed project facilities overlain. Descriptions of the pertinent soil types that would be potentially affected by the proposed project are described in detail in Appendix A.

Table 3-1 Soil Units in the Project Area

Soil Map Number*	Soil Mapping Unit Mapping Name*	Topographic Position	Slope	Soil Texture	Depth Class	Highly Erodable Soil?
Rio Blanco County						
6	Barcus channery loamy sand	Alluvial fans and narrow valleys	2 to 8%	Channery loamy sand, channery sand	Deep	No
15	Castner channery loam	Mountainsides, ridgetops, and uplands	5 to 50%	channery loam, cobbly loam, very channery sandy loam, very flaggy loam	Shallow	Yes
33	Forelle loam	Terraces and uplands	3 to 8%	Loam, clay loam, silt loam	Deep	No
36	Glendive fine sandy loam	Along drainage ways and alluvial valley floors	2 to 4%	Fine sandy loam, loamy fine sand to silt loam	Deep	Yes
40	Hagga loam	Flood plains and alluvial valley floors	0 to 5%	Loam, silty clay loam to loamy fine sand	Deep	No
41	Havre Loam	Flood plains and low stream terraces	0 to 4%	Loam, fine sandy loam to clay loam	Deep	No
42	Irigul channery loam	Ridges and mountinsides	5 to 50%	Channery loam, very channery clay loam, extremely channery loam	Shallow	Yes
43	Iorigul-Parachute complex	Ridges and mountainsides	5 to 30%	Channery loam, very channery clay loam, extremely channery loam	Shallow to moderately deep	Yes
56	Northwater loam	Mountainsides	5 to 50%	loam, very channery loam, very channery sandy clay loam,	Deep	Yes
58	Parachute loam	Ridges and mountainsides	35 to 75%	Loam, channery loam, very channery loam, very channery sandy loam, extermely channery sandy loam	Moderately deep	Yes
59	Parachute-Rhone loam	Mountainsides and upland ridges	5 to 30%	Loam, channery loam, very channery loam	Moderately deep	Yes
64	Piceance fine sandy loam	Uplands and broad ridgetops	5 to 15%	Fine sandy loam, loamy sandy clay loam, clay loam, channery sandy loam, channery loam, channery sandy clay loam	Moderately deep	Yes

Soil Map Number*	Soil Mapping Unit Mapping Name*	Topographic Position	Slope	Soil Texture	Depth Class	Highly Erodable Soil?
70	Redcreek-Rentsac complex	Mountainsides and ridges	5 to 30%	Sandy loam, channery sandy loam	shallow	Yes
73	Rentsac channery loam	Ridges, foothills, and side slopes	5 to 50%	Channery loam, very channery loam, sandy loam, and very flaggy loam	Shallow	Yes
76	Rhone loam	Mountainsides, upland ridges, and side slopes	30 to 75%	loam, very channery loam	Deep	Yes
82	Silas loam	Bottoms of narrow moungain valleys	0 to 8%	loam, sandy clay loam	Deep	No
87	Starman-Vandamore complex	Rolling ridges and windswept ridgetops	5 to 40%	Channery loam, gravelly loam, and very channery loam	Shallow to moderately deep	Yes
91	Torriorthents-Rock outcrop complex	Exteremely rough and eroded areas on mountainsides, hills, ridges, and canyonsides	15 to 90%		Very shallow to moderatly deep	Variable
96	Veatch channery loam	Mountainsides	12 to 50%	Channery loam, channery sandy loam, very channery sandy loam, extermely channery loam	Moderately deep	No on slopes <35%
104	Yamac loam	Rolling uplands, terraces, and fans	2 to 15%	Loam, clay loam, silt loam	Deep	No
Garfield County						
50	Irigul-Starman complex	Mountain ridges and crests and sides of hills	5 to 30%	channery loam, extremely channery loam	shallow	Yes
52	Northwater-Adel complex	Mountainsides and footslopes	5 to 50%	extremely channery loam, clay loam	Deep	Yes
55	Parachute-Irigul complex	Mountain ridges and the crests and sides of hills	5 to 30%	Loam, very channery loam	Moderately deep	Yes
56	Parachute-Irigul-Rhone complex	Mountain ridges and the crests and sides of hills	25 to 50%	Loam, very channery loam	Moderately deep	Yes
58	Parachute-Rhone loam	Mountainsides, ridge crests, upland slopes, and side slopes	5 to 30%	loam, channery loam, very channery loam	Moderately deep	Yes

Soil Map Number*	Soil Mapping Unit Mapping Name*	Topographic Position	Slope	Soil Texture	Depth Class	Highly Erodable Soil?
63	Silas loam	On bottom land of mountain valleys	1 to 12%	Loam	Deep	No
66	Torriorthents-cool-Rock outcrop	Steep, south-facing slopes of mountains, hills, ridges, and canyonsides	15 to 90%	Extremely variable	Shallow to deep	Yes
67	Tosca channery loam	Mountain side slopes and footslopes	25 to 80%	Channery loam, very channery loam	Deep	Yes
75	Wrayha-Rabbitex-Veatch complex	Canyon side slopes	45 to 65%	Gravelly sandy loam, loam, clay loam, silty clay loam	Moderately deep	Yes

3.4 SURFACE WATER

The Project Area is located mainly within the Piceance Creek watershed, which discharges into the White River. A minor portion of the Project Area (nine well pads and associated access roads) is located near the headwaters of the Roan Creek watershed. The climate of the Project Area is semi-arid, with an average annual precipitation of 12 to 14 inches. Evapotranspiration is less than or equal to the average precipitation. Surface water originates primarily as snowmelt runoff during April through June. Peak flooding events are caused by snowmelt and summer thunderstorms. Groundwater is reported to contribute 80 percent of the total flow to Piceance Creek (BLM 1986).

The Piceance Creek watershed covers approximately 652 square miles and is part of the White River watershed. The drainage area ranges in elevation from 9,770 feet on the Grand Hogback, east of the Project Area, to 5,705 feet at the confluence of Piceance Creek and the White River. The creek flows in a westerly direction from its headwaters near Rio Blanco to its confluence with the White River approximately 17 miles west of Meeker. The drainage area is characterized by steep-sided, rugged terrain with intersecting gulches incised into plateau areas.

3.4.1 Streams in the Project Area

Figure 3-4 provides a map of streams within and near the Project Area. The proposed project facilities would mainly be located along a series of tributaries to Piceance Creek, including Fawn Creek, East Fawn Creek, Little Dry Gulch, Dry Gulch, Hunter Creek, Willow Creek, and Whiskey Gulch. The pipeline route would extend along Hunter Creek from the well field to Piceance Creek, and then follow Piceance Creek to the north to the existing Colorado Interstate Gas sales point about 2 miles north of Rock School. Fawn Creek and portions of Hunter Creek have perennial flow. All other streams within the Project Area are ephemeral with flow occurring only after summer thunderstorms and during spring snowmelt. The

creek bottoms are typically vegetated with sagebrush and grasses. Stream channels within the creeks are typically incised into the sediments that cover the floor of the valley about 10-20 feet and support little riparian vegetation. A few small stock-watering ponds up to about 5 acres in size are present in the valley bottoms along Willow Creek and Hunter Creek. Project facilities located in the Roan Creek watershed are near the headwaters of several intermittent streams, including No Name Creek and Mud Springs Creek.

Streamflow data have been recorded at three gaging stations along Piceance Creek since 1964, and at one station on the White River downstream from Piceance Creek since 1982. The locations of the gaging stations are shown on Figure 3-5. The mean annual discharge at the stations is presented in Table 3-2. Mean annual discharge increases along Piceance Creek from about 21 cfs to 39 cfs. The available discharge data show that Piceance Creek provides about 5% of the flow in the White River. Records of discharge from Hunter Creek are available for the period March 1968 through March 1974. The discharge from Hunter Creek ranged from 0 to 3.7 cfs during this period with a mean discharge of 0.7 cfs. Records of discharge and water quality are not available for the other creeks in the Project Area, including the intermittent streams in the Roan Creek watershed.

Table 3-2. Stream Gaging Data for Piceance Creek and the White River

USGS Gaging Station	Range of Discharge (cfs)	Mean Annual Discharge (cfs)	Period of Record
Piceance Creek below Rio Blanco, CO 09306007	5.02-55.0	21.0	1975-1998
Piceance Creek below Ryan Gulch, CO 09306200	8.30-96.5	31.2	1965-2001
Piceance Creek at White River, CO 09306222	12.5-110	39.0	1965-2001
White River below Boise Creek, CO 09306290	428-1345	789	1982-2001

3.4.2 Surface Water Quality

The quality of water in the mainstem of Piceance Creek is protected for designated uses in accordance with the Colorado Water Quality Standards (5 CCR 1002-8 and 37; Region 11, Stream Segment 15). The creek is designated as:

- Class 2 – Warm Water Aquatic Life – waters that are not capable of sustaining a wide variety of warm water biota due to physical habitat, water flows, or uncorrectable water quality conditions
- Class 2 – Secondary Contact Recreation – waters that are suitable or intended to become suitable for recreational; uses on or about the water, including fishing and other streamside recreation

- Agriculture – waters that are suitable or intended to become suitable for irrigation of crops and that are not hazardous as drinking water for livestock

Table 3-3 provides a summary of water quality records for the three gaging stations on Piceance Creek for the period 1998 through 2001. The principal ionic constituents in Piceance Creek include sodium, calcium, magnesium, bicarbonate, sulfate, chloride, potassium, and fluoride. Sodium, bicarbonate, boron, strontium, and sulfate concentrations generally decrease during high flow conditions. Concentrations of dissolved solids increase during the late summer and fall when the flow in Piceance Creek decreases. Sulfate and total dissolved solids (TDS) exceed the Federal Drinking Water Secondary Standards of 250 mg/L and 500 mg/L, respectively, for most of the length of Piceance Creek. The upper range of recorded pH values is also greater than the secondary standard of 8.5. Trace metals concentrations measured in Piceance Creek are generally low and, with the exception of manganese, are below 10 ug/L for most analyses. All trace metals concentrations are below the applicable primary, secondary, and agricultural standards, except for lead, which has a primary standard of zero.

Sediment yield from Piceance Creek is high due to runoff from localized thunderstorms in the summer and fall carrying high sediment loads from the tributaries. Sediment loading at the confluence of Piceance Creek and the White River for the period 1970-2001 varied from a daily minimum of 0.1 tons to a maximum of 6,095 tons in May 1983.

Table 3-3. Piceance Creek Gaging Stations. Summary of USGS Water Quality and Discharge Data for Water Years 1998-2001[1]

	Below Rio Blanco 09306007		Below Ryan Gulch 09306200		At White River 09306222	
Parameter[2]	**Range[3]**	**Mean[4]**	**Range[5]**	**Mean[4]**	**Range[6]**	**Mean[4]**
discharge (cfs)	14-210	67.3	4-336	49.1	3-467	63.8
General Water Quality Indicators						
specific conductance (uS/cm)	875-1130	1010	964-2160	1520	1080-3950	2100
pH (standard units)	8.1-8.8	8.43	8.2-8.6	8.41	8.1-8.8	8.58
temperature (°C)	3.0-19.5	9.25	6.5-21.1	12.7	0-25.5	11.3
dissolved oxygen (mg/L)	7.3-12.1	10.25	6.7-12.6	10.1	7.7-11.6	9.96
total hardness (mg/L)	340-400	363	360-644	520	390-554	474
total alkalinity (mg/L)	319-369	343	358-733	463	319-1550	709
total dissolved solids (mg/L)	609-725	668	660-1430	1020	700-2490	1360
suspended solids (tons per day)	24.9-350	115	15-599	105	25-882	162
Major Ions (mg/L)[7]						
Calcium	67-75	71	62-85.2	78	30.4-76	60.9
Magnesium	40-52	44.5	47-105	78.1	49-104	77.6
sodium	71-110	95.3	75-248	159	100-882	335
potassium	2.3-2.8	2.43	2.1-3.5	2.72	2.1-4.4	3.02
Sulfate	170-250	210	210-514	386	230-535	390
chloride	9.8-17	14.5	11-23.4	16.4	14-150	47.3
Fluoride	0.4-0.7	0.58	0.4-1.2	0.67	0.5-2.8	1.12
silica	12-15	14	12-19.3	15.2	5.7-45.6	15.6
Nitrite	<0.01-0.02	0.01	0.003-0.02	0.01	<0.006-0.02	0.01
nitrite plus nitrate	0.68-1.66	1.18	<0.05-2.1	0.57	<0.05-2	0.55

	Below Rio Blanco 09306007		Below Ryan Gulch 09306200		At White River 09306222	
Parameter[2]	**Range[3]**	**Mean[4]**	**Range[5]**	**Mean[4]**	**Range[6]**	**Mean[4]**
Ammonia	0.03-0.07	0.04	<0.02-0.12	0.03	<0.02-0.132	0.03
Phosphorous	<0.01-0.06	0.02	<0.01-0.122	0.03	<0.01-0.096	0.03
Trace Metals (ug/L)[7]						
Aluminum			1-13	3.44	1-18	5.33
Arsenic	2-3	2.5	1.4-6	2.88	1.9-6.7	3.49
Barium	91-98	94.5	68-118	80.2	74-172	110
boron	68-140	112	73-272	169	97-642	289
cadmium			0.02-<1	0.29	0.03-<2	0.35
chromium			0.4-<1	0.41	0.4-<1	0.43
cobalt	<1	0.5	0.41-<1	0.5	0.48-<1	0.55
copper			1-2.7	2.03	2-8.9	3.28
iron	<10	5	7.9-20	8.1	<10-40	12
lead			0.05-<1	0.3	<0.08-<2	0.37
manganese	11-13	12	10-170	70.9	3-86.8	20.3
molybdenum	7-9	8	6-11	7.95	5.5-13	9.03
nickel	<1	0.5	<0.06-3.4	1.47	<1-3	1.55
selenium			1-<2.4	1.2	1.9-2.5	1.47
strontium	980-1500	1200	1300-3910	2800	1400-2830	2260
zinc	<20	10	1-<20	3.42	1-<20	5.44

[1]Source: USGS Water Resource Yearbooks, Colorado River Basin, Water Years 1998-2001
[2]All parameters are dissolved and in units of milligrams per liter, unless otherwise indicated
[3]Data collected during October 1997, March 1998, April 1998, and September 1998
[4]Mean calculated using one-half the detection limit for non-detect values
[5]Data collected during October 1997, March 1998, April 1998, September 1998, August 1999, November 1999, April 2000, May 2000, August 2000, November 2000, March 2001, July 2001, and August 2001
[6]Data collected during October 1997, March 1998, April 1998, September 1998, November1998, March 1999, April 1999, August 1999, November 1999, April 2000, May 2000, August 2000, November 2000, March 2001, July 2001, and August 2001
[7]Dissolved

Table 3-4 presents a summary of water quality records for the White River. Concentrations of the primary ions are generally lower in the White River than in Piceance Creek. Except for occasional exceedances of the upper range for pH, all parameters measured are less than the applicable drinking water standards for the White River. Sediment yield from the White River ranged from 8.7 to over 10,000 tons per day over the period 1998 to 2001, with a mean of 1,700 tons per day. Water quality records for the intermittent streams in the Roan Creek drainage are not available.

Table 3-4. White River Gaging Station 09306290. Summary of USGS Water Quality and Discharge Data for Water Years 1998-2001[1]

Parameter	Range[2]	Mean[3]
General Water Quality Parameters		
discharge (cfs)	253-3020	1030
specific conductance (uS/cm)	314-929	644
pH (standard units)	8.0-8.6	8.41
temperature (°C)	0-22.9	13.6
dissolved oxygen (mg/L)	4.3-13.1	8.93
total hardness (mg/L)	140-300	223
suspended solids (tons per day)	8.7-10900	1700
Major Ions (mg/L)		
Calcium	14-74.1	49.3
Magnesium	11-65	26.8
Nitrite	<0.001-0.02	0.01
nitrite plus nitrate	<0.005-0.44	0.11
Ammonia	<0.02-0.057	0.02
Phosphorous	<0.01-0.463	0.14
Trace Metals (ug/L)		
Aluminum	90-4900	2200
Arsenic	1-3	1.75
Barium	35.8-200	90.4
boron	17-61	38.9
Cadmium	<0.1-<1	0.29
Chromium	<1-9	3.19
Cobalt	<1-4	2
Copper	1-9	5.14
Iron	90-7300	3000
Lead	<1-7	3.29
Manganese	<10-300	118
Molybdenum	<1-4	1.41
Nickel	<1-10	4.69
Selenium	<1-2	1.05
strontium	373-930	643
Zinc	<10-30	20

[1]Source: USGS Water Resource Yearbooks, Colorado River Basin, Water Years 1998-2001
[2]Data collected during January, June, July, August, and November 1998, April, May, June, September, and November 1999, April, May, July, August, and November 2000, and March June, July, and August 2001.
[3]Mean calculated using one-half the detection limit for non-detect values
[4]Dissolved
[5]Total recoverable

3.5 GROUNDWATER

3.5.1 Regional Setting

Groundwater occurs in both bedrock and alluvial aquifers beneath the Piceance Basin. Figure 3-2 shows the relationship between geologic formations and hydrostratigraphic units for the Piceance Basin. The principal water-bearing bedrock units within the basin include the Uinta Formation and parts of the Green River Formation. The lower portions of the

Green River Formation and the underlying Wasatch Formation consist of low-permeability clays, shales, and sandstones and form an aquitard beneath the Project Area. The aquifer systems extend over 700 square miles (Robson and Saulnier 1981) and contain an estimated groundwater reserve of 25 million acre-feet (BLM 1983). Groundwater gradients within the basin range from about 20 to as much as 120 feet per mile (Robson and Saulnier 1981).

3.5.2 Aquifer Systems within the Project Area

The groundwater system within the basin in the vicinity of the Project Area is typically divided into three aquifers: 1) Alluvial Aquifer, 2) Upper Aquifer, and 3) Lower Aquifer (Weeks and Welder 1974). The Alluvial Aquifer, comprised of unconsolidated sand, gravel, silt, and clay, occurs as discontinuous units along valley bottoms. The saturated thickness of this aquifer is variable, ranging from a few feet to up to 100 feet along the lower reaches of Piceance Creek (Weeks and Welder 1974). Weeks and Welder (1974) reported that high pumping rates can initially be obtained from alluvial aquifer wells at some locations within the basin, but the high rates can only be sustained for short periods because of the limited extent of the aquifer. Groundwater occurs under confined and semi-confined conditions within the Alluvial Aquifer.

The Upper Aquifer consists of fractured, lean oil shale of the Parachute Creek Member of the Green River Formation above the Mahogany Zone, and sandstone, siltstone, and fractured marlstone of the saturated portion of the overlying Uinta Formation. The primary porosity of materials within the Upper Aquifer is generally low, but the permeability is enhanced by secondary features such as fractures, faults, joints, and solution cavities (Weeks and Welder 1974). Groundwater in the Upper Aquifer usually exists under confined conditions except near outcrop areas. Hydraulic conductivity of the Upper Aquifer ranges from about 0.2 to 0.6 feet per day (Glover et al 1998).

The Lower Aquifer consists of fractured oil shale and marlstone of the Parachute Creek Member of the Green River Formation. The hydraulic conductivity of the Lower Aquifer ranges from about 0.1 to 0.6 feet per day (Glover et al 1998). The Mahogany Zone acts as a confining unit between the Upper and Lower aquifers. The Lower Aquifer is also referred to as the Leached Zone because secondary porosity and permeability have been enhanced by the dissolution of minerals, mainly nahcolite, by percolating groundwater. Groundwater within the Lower Aquifer generally exists under confined conditions.

Perched groundwater zones also occur locally within the Uinta Formation and are not considered to be part of the Upper Aquifer. These perched zones can occur in the ridges between surface water drainages and may be manifested as springs and seeps above the valley floor in outcrop areas (Weeks and Welder 1974; Cole et al 1995).

Recharge areas for the Upper and Lower Aquifers are present on the top of the Douglas Plateau and Roan Cliffs, to the south of the Project Area. The estimated total recharge to the Piceance Basin aquifer systems north of the Colorado River is about 30,400 acre-feet per year (Glover et al 1998).

3.5.3 Groundwater Quality

The chemical quality of groundwater in the Piceance Basin varies both within and among the aquifers. Water from the Alluvial, Upper, and Lower Aquifers generally does not meet all applicable drinking water standards. In particular, the concentration of total dissolved solids exceeds 500 mg/L in all but 3 of the 75 water analyses reported by Ficke, Weeks, and Welder (1974) and Weeks and Welder (1974). The concentration of dissolved solids generally increases from the basin margins to the center of the basin.

Table 3-5 provides a summary of water quality results for the three aquifers, based on USGS data. Groundwater quality for the Alluvial Aquifer is based on 27 samples collected from alluvial wells located on Piceance Creek, Yellow Creek, Ryan Creek, Black Sulphur Creek, and Fawn Creek. Waters from these wells are typically classified as a sodium bicarbonate type, with total dissolved solids (TDS) concentrations ranging from 469 to 6,720 mg/L. Higher TDS levels are typically found downstream toward the White River are attributed to irrigation water return, groundwater inflow from bedrock aquifers, and the concentrating effect of evaporation (Weeks and Welder 1974). Alluvial Aquifer waters generally contain high sulfate concentrations (up to 1,500 mg/L). The water quality reported for the springs (see Table 3-8) is also representative of alluvial groundwater quality for the area.

Groundwater quality in the Upper Aquifer is based on 17 samples collected from wells located throughout the northern portion of the Piceance Basin. Waters from these wells are classified as a sodium bicarbonate type, with TDS values ranging from 345 to 2,180 for the saturated portion of the Uinta Formation and 610 to 3,276 mg/L for the Parachute Creek Member.

Groundwater quality in the Lower Aquifer is based on 27 samples from wells located throughout the northern portion of the Piceance Basin. Waters from these wells are generally classified as a sodium bicarbonate-chloride type with TDS concentrations ranging from 491 mg/L along the margins of the basin, where the proposed project would be located, to 38,900 mg/L in the center of the basin. Compared to waters from the Alluvial Aquifer and Upper Aquifer, the Lower Aquifer contains much higher concentrations of potassium, sodium, bicarbonate, chloride, fluoride, nitrate, nitrite, and phosphorous, and lower concentrations of calcium, magnesium, and sulfate.

Table 3-6 presents groundwater data collected from three wells completed within the Upper Aquifer beneath the Project Area. Well 14 is located on Eureka Creek, well 30 on Hunter Creek, and well 59 on Fawn Creek. The concentrations of major ions in samples from these three wells are similar to those reported by the USGS. The range of TDS concentrations is slightly lower than reported for the USGS samples, reflecting the location of these wells closer to the basin margin.

Table 3-5. Summary of Water Quality Results for Three Aquifers

Parameter[2]	Alluvial Aquifer[3]		Upper Aquifer[4]		Lower Aquifer[5]	
	Range	Mean	Range	Mean	Range	Mean
Potassium	0.8-6.8	2.5	0.2-6	1.5	0.4-78	11
Sodium	66-2,900	490	55-650	210	230-16,000	3,980
Calcium	2.4-120	57	7.4-110	50	2.8-15	7.4
Magnesium	3.6-160	80	9.8-187	60	3.0-26	9.5
Bicarbonate	336-3,560	1,220	307-918	550	493-40,000	9,100
Chloride	5.2-270	42	3.4-63	16	1.3-2,900	690
Sulfate	41-1,500	430	34-850	320	4.2-350	80
Fluoride	0.1-33	4.6	0-12	1.4	5.0-66	28
TDS	469-6,720	1,750	345-2,180	960	491-38,900	9,400

[1]Data from Ficke et al (1974) and Weeks and Welder (1974)
[2]All units in mg/L
[3]Based on 27 samples from alluvial wells
[4]Based on 17 samples from Upper Aquifer wells
[5]Based on 27 samples from Lower Aquifer wells

Table 3-6. Summary of Water Quality Results for wells within the Project Area

Parameter	Range	Mean
General Water Quality Indicators		
Specific conductance (umhos/cm)	923-1340	1200
Total dissolved solids (mg/L)	563-895	769
Total alkalinity (mg/L)	275-651	424
Major Ions (mg/L)		
Calcium	10-38	23.6
Magnesium	4.2-29	17.5
Sodium	190-310	235
Potassium	0.3-1.4	0.71
Sulfate	3.6-390	202
Chloride	4.8-20	10.9
Fluoride	0.2-17	7.16
Nitrate plus nitrite	<0.01-0.06	0.02
Silica	13-19	16.6
Trace Metals (ug/L)		
Arsenic	<0.01-8	3.75
Barium	<10-900	229
Boron	130-590	350
Iron	70-590	290
Molybdenum	<0.1-52	17.8
manganese	10-50	37.5
Selenium	<0.01-6	2.88
Strontium	720-7400	4100

[1]Based on samples collected from existing wells 14, 30, and 59 (Ficke et al 1974; Weeks and Welder 1974)

3.5.4 Springs

There are 25 mapped springs within the Project Area, as shown on Figure 3-6 (BLM 1983 unpublished data). These springs are present at elevations ranging from 7,440 feet to 8,240 feet amsl and are located at the head of draws, in drainage bottoms, and on hillsides. Table

3-7 provides a listing of the identified springs in the Project Area. Discharge from the springs, as measured in 1983, ranges from immeasurable to 109 gallons per minute (gpm). The current use of water from the springs is for stock and wildlife watering. Six of the springs have private water rights for stock watering (as of 1983). Table 3-8 provides water quality information for these springs (BLM 1983 unpublished data). The waters from these springs are generally classified as calcium bicarbonate type waters. Concentrations of calcium, sodium, potassium, and chloride are similar for all springs within the Project Area.

Table 3-7. Listing of the Identified Springs in the Project Area

Map Spring No.	Spring Name	Altitude (ft amsl)	Discharge (gpm)	Perennial flow?	Topographic location	Water Rights?
P.184.01		8,120	5.45	yes	headwall of draw	no
P.184.02	Sylvan	7,880	21.43	yes	upland draw	yes, 1981
P.184.03	On The Border	8,020	27.27	yes	streambank	yes, 1981
P.184.05	Animal Path	8,160	0.05	yes	hillside	yes, 1981
P.184.06	Slippery	8,080	109.1	yes	stream channel	yes, 1981
P.184.07	West Fawn Creek	7,960	5.71	yes	stream channel	no
P.184.10	Mud Springs Well	8,140	3.75	yes	flat	no
P.184.11	MJB	7,840	16.9	yes	upland draw	yes, 1935
P.184.12		7,600	20	yes	draw	no
P.184.13		7,800	24	yes	head of draw	no
P.184.16		7,800	37.5	yes	upland draw	no
P.184.17		7,480	38.5	yes	hillside	no
P.184.19		8,000	5	yes	side of channel	no
P.184.21		7,440	21.3	yes	upper bank of stream	no
P.184.22		7,680	2.5	yes	upland draw	no
P.184.23		8,080	2.4	yes	stream bank	no
P.185.10		8,040	seep	yes	drainage channel	no
P.185.11	Moo Pond	8,240	0.19	yes	drainage channel	yes, 1981
P.185.15		7,770	2.98	yes	steep gulley bottom	no
P.185.16	West Hunter #1	7,570	4.8	yes	steep drainage bottom	no
P.185.17	Whiskey Gulch	7,800	0.82	yes	drainage bottom	no
P.185.21		7,790	30	yes	drainage bottom near aspen	no
P.185.22		7,840	8.63	yes	draw above fork in stream	no
P.185.23		8,040	30	yes	drainage bottom near aspen	no
P.185.29		7,640	0.39	yes	drainage bottom near aspen	no

Table 3-8. Water Quality Information for Springs

Map Spring Number	calcium	sodium	potassium	bicarbonate	chloride	hardness
P.184.01	110	19	2		4.6	49
P.184.02	170	40	0.58	1067	2.7	25
P.184.03	180	30	<1	970	3.1	44
P.184.05	198	23	8		<5	92
P.184.06	145	19	2		<5	64
P.184.07	110	17	0.5	804	5.4	45
P.184.10	110	38	1.2	1350	8.8	45
P.184.11	220	41	0.6	830	<4	130
P.184.12	600	33	1.1	60	20	300
P.184.13	520	29	0.76	795	11	240
P.184.16	200	32	0.52	92	3	32
P.184.17	520	41	0.72	281	18	240
P.184.19	120	23	0.69		7	49
P.184.21	720	40	0.9	795	19	330
P.184.22	660	62	<0.5	524	45	330
P.184.23	180	30	<1	1019	3.2	44
P.185.11	235	11	2		<5	95
P.185.15	290	62	0.52	1860	8.2	170
P.185.16	340	88	0.52	1316	18	230
P.185.17	310	92	0.9	1880	7.4	46
P.185.21	240	43	0.54	1164	5.4	32
P.185.22	200	35	0.5	1164	3.5	28
P.185.23	220	26	0.66	1164	3.4	28
P.185.29	410	64	0.54	1764	22	43

All results in mg/L

3.6 AIR QUALITY AND CLIMATE

3.6.1 Climate

The Figure Four Project Area is located in a high mountainous continental climate regime on the southern slopes of the Piceance Creek basin. The topography in the Project Area slopes downward south to north with a series of southwest to northeast trending ridges and valleys. Elevations in the Project Area range from 6,100 feet above mean sea level (msl) to 8,500 feet msl. The climate of the Project Area is classified as semi-arid continental characterized by low relative humidity and precipitation, abundant clear skies, high evaporation, and large daily temperature ranges.

Specifically, the temperature and precipitation in the Project Area can be represented by the Little Hills meteorological monitoring station approximately 25 miles northeast of the Project Area at an elevation of 6,140 feet msl. Data were collected from 1948 to 1991 (Western Regional Climate Center 2003). The annual temperature varies from a maximum mean monthly temperature of 86 ˚F in July to a mean monthly minimum temperature of 3 ˚F in January. The Project Area receives about 14 inches of precipitation annually and 86 inches

of snow between October and May. Precipitation is fairly equally distributed from March through October (about an average of 1.3 inches per month), and tends to be less than an inch from November through February. Table 3-9 provides a summary of Project Area climate data.

The transportation and dilution of air pollutants are functions of wind velocity and atmospheric turbulence. The wind velocity dictates the direction in which pollutants are transported and the atmospheric turbulence (a function of temperature and wind speed) dictates the dilution rate for pollutants.

The Meteorological data collected in 1984 at the Occidental Shale Tract Cb (BLM 1999) are considered to be representative of the Project Area. The wind data tabulated in Table 3-10 show that the wind blows from the southeast through the southwest approximately 67 percent of the time. Note that the data represent the direction from which the wind is blowing. For example, winds blowing from the south would transport pollutants to the north and vice versa. Therefore, on an average annual basis, pollutants would be transported northward approximately 67 percent of the time.

Table 3-9. Project Area Climate

Month	Temperature (°F)		Precipitation (Inches)			
	Mean Maximum	Mean Minimum	Mean	Maximum	Mean Snowfall	Maximum Snowfall
January	37	3	0.74	1.87	10.8	33.0
February	42	8	0.79	3.09	9.2	30.6
March	48	17	1.24	2.82	11.5	31.7
April	58	24	1.44	3.33	5.1	18.0
May	68	32	1.36	3.23	1.1	11.5
June	79	38	1.11	3.84	0.1	3.0
July	86	45	1.25	3.97	0.0	0.0
August	83	43	1.55	4.50	0.0	0.0
September	76	34	1.17	5.29	0.1	2.2
October	64	24	1.24	4.32	2.4	13.0
November	49	14	0.97	2.31	5.9	35.5
December	39	5	0.95	2.65	10.5	29.5
Annual	**61**	**24**	**13.82**	**20.37**	**86**	**208**

Source: Western Regional Climate Center 2003.

Table 3-10. Project Area Wind Distribution

Direction Wind Blowing From	Frequency[1]	Direction Wind Blowing From	Frequency[1]
North	2%	South	13%
North-Northeast	3%	South-Southwest	20%
Northeast	2%	Southwest	11%
East-Northeast	2%	West-Southwest	5%
East	3%	West	5%
East-Southeast	5%	West-Northwest	6%
Southeast	6%	Northwest	7%

Direction Wind Blowing From	Frequency[1]	Direction Wind Blowing From	Frequency[1]
South-Southeast	7%	North-Northwest	4%

[1] Wind is calm less than 1%. Source: BLM 1999.

3.6.2 Project Area Air Quality

National Ambient Air Quality Standards (NAAQS) have been promulgated for the purpose of protecting human health and welfare with an adequate margin of safety. The State of Colorado has adopted the NAAQS with a modification for sulfur dioxide (SO_2). Criteria pollutants for which standards have been set include SO_2, nitrogen dioxide (NO_2), carbon monoxide (CO), particulate matter less than 10 or 2.5 microns in effective diameter (PM_{10} and $PM_{2.5}$), and ozone (O_3). Existing air quality in the region is acceptable based on State of Colorado standards for the protection of human health. Garfield and Rio Blanco Counties are designated as attainment areas, meaning that the concentration of criteria pollutants in the ambient air is less than the NAAQS (CAQCC 2003). Additionally, representative monitoring of air quality in the general area indicates that the existing air quality is well within acceptable standards. Table 3-11 provides a summary of representative air quality data for the Piceance Creek area.

Table 3-11. Existing Air Quality Summary for Piceance Creek Area

Pollutant	Averaging Period					Monitoring Station Location Description
	Annual	24-Hour	8-Hour	3-Hour	1-Hour	
	Ambient Air Average Concentration (µg/m^3)					
PM_{10}	24	54	NA	NA	NA	Rifle, Garfield County. (1998-2000 data collected by CDPHE) [a]
$PM_{2.5}$	7	19	NA	NA	NA	Grand Junction, Mesa County. (1999-2001 data collected by CPHE) [a]
NO_2	34	NA	NA	NA	NA	Provided by CDPHE [a]
CO	NA	NA	4,444	NA	8,000	Grand Junction, Mesa County. (Average of 1999-2001) [a]
SO_2	11	39	NA	110	NA	Provided by CDPHE [a]
Ozone			145		145	Provided by CDPHE[b]

NA: not applicable
µg/m^3: micrograms of pollutant per cubic meter of ambient air
[a] Background concentrations recommended by CDPHE for the Glenwood Springs RMP air quality analysis
b (Navy Chick) as composite averages of ozone monitoring locations in western Colorado and Eastern Utah

3.6.3 Regulatory Setting

Under the Prevention of Significant Deterioration (PSD) provisions of the Clean Air Act (CAA) administered by the State of Colorado, incremental increases of specific pollutant concentrations are limited above a legally defined baseline level. Many national parks and wilderness areas are designated as PSD Class I. The PSD program protects air quality within Class I areas by allowing only slight incremental increases in pollutant concentrations. Areas

of the state not designated as PSD Class I are classified as Class II. For Class II areas, greater incremental increases in ambient pollutant concentrations are allowed as a result of controlled growth. The area surrounding the Project is designated as PSD Class II. The Colorado Ambient Air Quality Standards, existing air quality, and PSD increments for Class I and II areas are presented in Table 3-12.

Table 3-12. Ambient Air Quality Standards and PSD Increment Values

Pollutant	Averaging Period(s)	Colorado Ambient Air Quality Standard ($\mu g/m^3$)	PSD Class II Increments [1] ($\mu g/m^3$)	PSD Class I Increments [1] ($\mu g/m^3$)
SO_2	Annual	15	20	2
	24-hour	100	91	5
	3-hour	700	512	25
NO_2	Annual	100	25	2.5
PM_{10}	Annual	50	30	4
	24-hour	150	17	8
CO	8-hour	10,000	None	None
	1-hour	40,000	None	None
Ozone	8-hour	157	None	None
	1-hour	235	None	None

Source: Colorado Air Pollution Control Division
$\mu g/m^3$: micrograms of pollutant per cubic meter of ambient air
[1]Increments expressed as allowable increases over an established baseline.

3.6.4 Class I Areas

National Parks and certain USDA - Forest Service managed wilderness areas are designated as federally mandated Class I areas. Within these Class I areas, the allowable increases in air pollution is much smaller than for all other areas. Similarly, only small changes are permitted for Air Quality Related Values (AQRV) such as visibility and acid deposition in Class I areas. In addition, certain National Monuments in the region that are designated as Class II areas are also considered sensitive to visibility and AQRV impacts.

Visibility is best characterized by the parameters standard visual range (SVR), which represents the greatest distance at which an observer can just see a black object viewed against the horizon sky. Visibility related background data are collected as part of the Interagency Monitoring of Protected Visual Environments (IMPROVE 2004) program. IMPROVE data for 2001, the latest available, indicates that visibility is generally very good in northwestern and central Colorado.

Table 3-13 summarizes the visibility conditions measured at Class I areas. The location of Class I and Class II areas in the project region are shown on Figure 3-7. The 2001 data shows the SVR value that is equal to or higher 20 percent of the year (the 20% best), the annual mean SVR, and the SVR value that is equal to or lower 20 percent of the year (the 20% worst).

Table 3-13. Visibility Conditions Measured at Class I Areas

Sensitive Area	Federal Land Manager	PSD Designation	Distance [1] from Proposed Action (kilometers)	20% Best SVR (kilometers)	Mean SVR (kilometers)	20% Worst SVR (kilometers)
Black Canyon of the Gunnison National Park [b]	NPS	Class I	147	290	211	139
Eagle's Nest Wilderness Area [a]	FS	Class I	185	290	211	139
West Elk Wilderness Area [b]	FS	Class I	162	290	211	139
Flat Tops Wilderness Area [a]	FS	Class I	78	290	212	140
Maroon Bells-Snowmass Wilderness Area [a]	FS	Class I	148	291	212	140
Mt. Zirkel Wilderness Area [a]	FS	Class I	166	253	185	127
Arches National Park [c]	NPS	Class I	168	226	167	119
Colorado National Monument [c]	NPS	Class II	89	226	167	119
Ouray National Wildlife Refuge [c]	USFWS	Class II	122	226	167	119
Raggeds Wilderness Area [b]	[FS	Class II	134	290	211	139
Dinosaur National Monument [c]	NPS	Class II	110	226	167	119
Holy Cross Wilderness Area [b]	FS	Class II	163	290	211	139

[a] Measured IMPROVE data[b]
[b] No measurement available – estimated from Flat Tops data
[c] No measurement available – estimated from nearby Canyonlands NP IMPROVE data
[1] Distance from center of Figure Four Project Area to closest boundary of Class I area Source: IMPROVE 2004.

An additional concern is the potential of changing the Acid Neutralizing Capacity (ANC) of lakes within high elevation PSD Class I and other sensitive areas. Table 3-14 provides background ANC data for lakes identified by the USDA – Forest Service within PSD Class I and II area located in the project region.

Table 3-14. Measured Acid Neutralizing Capacity of Sensitive Lakes Within Nearby PSD Class I and II Areas

Location	Sensitive Lake	Background ANC (µeq/l)	Watershed Area (acres)
Eagle's Nest WA	Booth	84.1	138
Flat Tops WA	Ned Wilson	38.0	124
Holy Cross WA	Blodget	36.9	127
Maroon Bells WA	Moon	51.5	397

Location	Sensitive Lake	Background ANC (µeq/l)	Watershed Area (acres)
Raggeds WA	Deep Creek #1	44.3	360
West Elk WA	S. Golden	111.0	112

µeq/l – microequivalents per liter
Source: USDA-Forest Service (2001)

3.7 NOISE

Noise is generally described as unwanted sound. Discussions of environmental noise do not focus on pure tones because commonly heard sounds have complex frequency and pressure characteristics. Accordingly, sound measurement equipment has been designed to account for the sensitivity of human hearing to different frequencies. Correction factors for adjusting actual sound pressure levels to correspond with human hearing have been determined experimentally. For measuring noise in ordinary environments, A-Weighted correction factors are employed. The filter de-emphasizes the very low and very high frequencies of sound in a manner similar to the response of the human ear. Therefore, the A-weighted decibel (dBA) is a good correlation to a human's subjective reaction to noise.

The dBA measurement is on a logarithmic scale. To the average human ear, the apparent increase in "loudness" doubles for every 10 dBA increase in noise (Bell 1982). Taking a baseline noise level of 50 dBA in a daytime residential area, noise of 60 dBA would be twice as loud, 70 dBA would be four times as loud, and 80 dBA would be eight times as loud.

3.7.1 Regulatory Noise Standards

The BLM has not established noise standards for the Figure Four Project Area. However, the Environmental Protection Agency (EPA) established a noise level of 55 dBA as a guideline for acceptable environmental noise (EPA 1974). This established noise level is used for a basis of evaluating noise effects when no other local, county, or state standard has been established. It is important to understand that this noise level was defined by scientific consensus, was developed without concern for economic and technological feasibility, and contained a margin of safety to ensure its protective value of the public health and welfare. Furthermore, this noise level is directed at sensitive receptors (residences, schools, medical facilities, recreational areas) where people would be exposed to an average noise level over a specific period of time.

In this context, public health and welfare includes personal comfort and well-being, and the absence of mental anguish, disturbances, and annoyance as well as the absence of clinical symptoms such as hearing loss or demonstrable physiological injury. Therefore, a 55 dBA noise level is not a regulatory requirement. Rather, the 55 dBA noise level should be recognized as a level below which there is no reason to suspect that the public health and welfare of the general population would be at risk from any of the identified effects of noise. A noise level of 55 dBA can be compared to a common human experience. A noise level of 60 dBA is generated during the normal conversation of two people five feet apart. Therefore,

a noise level of 55 dBA from a nearby source would barely be audible during normal conversation.

The Colorado Oil and Gas Conservation Commission (COGCC 2004) has established regulatory noise limits for oil and gas facilities on state and private lands as follows:

> "Oil and gas operations, including gas facility operations, shall comply with the following maximum permissible noise levels for the predominant land use existing in the zone in which the operation occurs. Any operation involving pipeline or gas facility installation or maintenance, the use of a drilling rig, completion rig, workover rig, or stimulation is subject to the maximum permissible noise levels for industrial zones. In the hours between 7:00 a.m. and the next 7:00 p.m. the noise levels permitted below may be increased ten (10) db(A) for a period not to exceed fifteen (15) minutes in any one (1) hour period".

The COGCC noise limits are summarized in Table 3-15.

Table 3-15. COGCC Maximum Permissible Noise Levels

Land Use	7:00 am to next 7:00 pm	7:00 pm to next 7:00 am
Residential	55 db (A)	50 db (A)
Industrial	80 db (A)	75 db (A)

3.7.2 Common Noise Levels

The following presents a discussion of noise levels common to most people. These levels are meant to represent the average noise levels over a given period (for example, a 24-hour interval or a yearly average) in various land use areas. Depending on the location and the quantity and type of noise sources, these levels can have a large variation but generally vary in the range of 3 to 5 dBA (EPA 1974). For a comparison to a normal human activity, the noise level experienced during normal conversation of two people five feet apart is 60 dBA. Table 3-16 shows examples of noise levels generated by commonly experienced sources and the relative strength of the "loudness" of noise levels compared to normal conversation.

Table 3-16. Common Noise Levels

Noise Source	Average Noise (dBA)	"Loudness" (based on normal conversation baseline)	Range of Noise (dBA)
Ambulance siren at 100 feet	100	16	95-105
Motorcycle at 25 feet	90	8	85-95
On a typical construction site	85	6	80-90
Single truck passing at 25 feet	80	4	75-85
Urban shopping center	70	2	65-75
Single car passing at 25 feet	65	1.5	60-70
Average highway noise at 100 feet	60	1	55-65

Noise Source	Average Noise (dBA)	"Loudness" (based on normal conversation baseline)	Range of Noise (dBA)
Normal conversation 5 feet apart	60	1	57-63
Residential area during day	50	50%	47-53
Recreational area	45	37%	40-50
Residential area at night	40	25%	37-43
Rural area during day	40	25%	37-43
Rural area at night	35	18%	32-37
Quiet whisper	30	12%	27-33
Threshold of hearing	20	6%	17-23

Source: EPA (1974), Harris (1991)

3.7.3 Existing Project Area Noise Levels

Currently, natural gas drilling and production activities are widespread but limited in scale near the Project Area. With the exception of traffic on the Piceance Creek Road north of the Project Area, no other significant noise sources are nearby. Noise levels are elevated near well pad and access road construction, drilling rigs, and along access roads. However, because of the limited development, it is estimated that overall noise levels are typical of a rural area (about 40 dBA), especially away from natural gas development and production equipment. On the northern portion of the proposed pipeline route, vehicle-related noise generated on Piceance Creek Road is sporadic and likely in the 55 – 65 dBA range as shown on Table 3-16.

3.8 VEGETATION AND RANGELAND RESOURCES

3.8.1 Vegetation Communities

Vegetation communities in the Project Area are typical of the landscape characteristic of northwest Colorado where elevation, slope, and soil parent material are controlling factors for plant composition. Elevation in the analysis area ranges from 6,100 at Piceance Creek to 8,500 feet atop the Roan Plateau, and the rolling topography creates a conglomerate of changing slopes across the landscape. These factors along with soil characteristics create five main habitat types within the Project Area: pinyon-pine/juniper woodlands, mountain shrub communities, Wyoming and mountain big sagebrush steppe, aspen woodlands, and a barren/rock outcrop association. Figure 3-8 provides a map of these dominant vegetation communities in the Figure Four Project Area. Succession of the habitat types is typical, with pinyon/juniper woodlands occurring at lower elevations, followed by mountain/big sagebrush shrub communities, and finally by aspen woodlands at the higher elevations.

3.8.1.1 Pinyon-Juniper Woodland

In northwest Colorado, pinyon-pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma)* woodlands are widespread between 5,000 and 7,000 feet in elevation. Juniper tends to grow at lower elevations and in more arid areas as its scaled foliage allows it to conserve water more effectively than pinyon pine. Both pinyon and juniper woodlands occur across the

northern stretches of the Project Area. Because of the elevation in the Project Area, pinyons are the dominant species. Several closed-canopied stands exist across the northern sections of the area. These stands exhibit forest-like dynamics and species composition, commonly including a significant shrub component of serviceberry (*Amelanchier alnifolia*), Gambel oak (*Quercus gambelii*), and mountain mahogany (*Cercocarpus montanus*). The dominant species within the herbaceous understory include Indian ricegrass (*Oryzopsis hymenoides*), bluebunch wheatgrass (*Agropyron spicatum)*, and needle-and-thread (*Stipa comata*). Juniper-dominated woodlands tend to occur north of the Project Area where open savannas of scattered trees occur without a significant shrub component, except in areas where basin big sagebrush (*Artemisia tridentata*) is abundant. In total, there are approximately 758.7 acres of pinyon-juniper woodland in the Project Area.

3.8.1.2 Mountain Shrub

Mountain shrub communities occur throughout northwest Colorado, typically at elevations between 6,000 and 8,000 feet. These community types are routinely found on steep slopes where there is poor soil development and cold microclimates. Mountain shrub is the dominant vegetative community type in the Project Area. These communities are found on nearly all ridges, hillsides, and slopes across the area. The most common species within this vegetation type include; serviceberry, Gambel oak, big sagebrush, common rabbitbrush (*Chrysothamnus nauseosus*), antelopebrush or bitterbrush (*Purshia tridentata*), and mountain mahogany. The most common grasses and grass-like species within the understory of this community are letterman (*Achnatherum lettermanii*) and Columbia needlegrass (*A. nelsonii*), western (*Pascopyrum smithii*), bearded (*Pseudoroegneria spicata*), beardless bluebunch (*P. spicata* ssp. *inerme*) and slender wheatgrass (*E. trachycaulus*), nodding (*Bromus anomalus*) and polyanthus brome (*B. polyanthus),* onion grass (*Melica bulbosa*), big bluegrass (*Poa ampla*), sandberg (*P. secunda*), mutton (*P. fendleriana*) and Kentucky bluegrass (*P. pratensis*), various sedges (*Carex spp*.) and Cheatgrass *(Bromus tectorum L*). Common forbs include American vetch (*Vicia Americana var. Americana*), and northern bedstraw (*Galium boreale*). In total, there are approximately 3,981.6 acres of the mountain shrub community in the Project Area.

3.8.1.3 Sagebrush Steppe

Sagebrush steppe communities occur throughout Colorado typically at elevations between 5,000 and 8,500 feet. This community type is found most often on mountain flattops, plains, and valley bottoms, near drainages. In the Project Area, this community type is characterized by a somewhat sparse to dense (20% to 90%) shrub layer dominated by big sagebrush. The understory within this vegetative community includes various species of wheatgrass, bluegrass, smooth brome, needle-and-thread, Indian ricegrass, and various sedges. Sagebrush habitat occurs along most valley bottoms and ridge-tops, primarily in the southwest portions of the Project Area. In total, there are approximately 10,303.8 acres of the sagebrush steppe community in the Project Area.

3.8.1.4 Aspen Woodland

Quaking aspen (*Populus tremuloides*) are commonly found between 7,500 and 10,500 feet, in small isolated pockets on northern exposures and protected slopes. The combination of a cool microclimate and favorable moisture conditions in many stands often leads to a rich forest floor of grasses, forbs, and shrubs. In the Project Area, aspen are found primarily in drainages and on north- facing slopes above 7,400 feet. Understory species in these stands typically consists of grasses including needle-and-thread, buffalo grass, letterman and Columbia needlegrass, western, bearded, beardless bluebunch and slender wheatgrass, nodding and polyanthus brome, onion grass, big bluegrass, sandberg, mutton and Kentucky bluegrass and Idaho fescue (*Festuca idahoensis*). Aspen occurrence in the area is limited, as adequate habitat only exists in the southeast section of the Project Area. This limited distribution as well as the importance of these stands to many wildlife species make these forests a significant biotic community in the Project Area. In total, there are approximately 2,412.3 acres of aspen woodland in the Project Area.

3.8.1.5 Barren/Rock Outcrop

Barren/rock outcrops found within the Project Area include areas such as exposed rock, erosion pavements, rock outcrops, cliffs, and talus slopes that have no or only sparse vegetation (BLM 1997a). These rock exposures consist of a geologic formation known as the Thirteenmile Tongue of the Green River Formation. This formation provides habitat for endemic, rare plant species in the Project Area. Other geologic formations found in the Project Area include outcrops of the Uintah and Parachute Creek member of the Green River Formation. In total, there are approximately 1.7 acres of barren/rock outcrop in the Project Area.

3.8.2 Special Status Plant Species

Special status plants include federally listed and candidate endangered and threatened species, BLM sensitive species, and those considered rare by the Colorado Natural Heritage Program (CNHP). Threatened and endangered plant species are not expected to occur within the Project Area (T. Meagley, BLM, personal communication, May 24, 2004). Table 3-17 identifies the special status plants that may occur within the Project Area and summarizes the habitat type. Botanical surveys of the Project Area to identify specific locations and distribution of special status plant species will be conducted by B&A in the spring of 2004.

Table 3-17. Special Status Plant Species that may occur in Figure Four Project Area

Common Name	Scientific Name	Classification	Habitat Type
Utah gentian	*Gentianella tortuosa*	BLM Sensitive	Barren shale outcrops of the Green River Formation on the Cathedral Bluffs.(8,500 to 10,800 ft.)
Piceance bladderpod	*Lesquerella parviflora*	BLM Sensitive	Shale outcrops of Green River Formation (6,200 to 8,600 ft.)

3.8.3 Noxious Weeds

The spread of non-native plants and noxious weeds is a concern in areas proposed for surface development activities. Weeds are plants that are designated by a federal, state, or county government as injurious to public health, agriculture, recreation, wildlife, or property. A noxious weed is commonly defined as a plant that grows out of place and is competitive, persistent, and pernicious (James et al. 1991). Invasive plants include not only noxious weeds but also other plants that are not native to this country. Many consider a plant invasive if it has been introduced into an environment where it did not evolve. As a result, invasive plants do not have any natural enemies (e.g. insects, other plants) to limit their reproduction. Many invasive plants can spread through areas undeterred, producing significant changes to native vegetation communities. Specific negative effects of noxious and invasive weeds can include: 1) reduction in the overall visual character of any area; 2) competition with, or elimination of native plants; 3) reduction or fragmentation of wildlife habitats; and 4) increased soil erosion.

Weed invasion and establishment is moderate to high within the White River Field Office area. The most common disturbance areas include roadsides and adjacent washes. The most common noxious weeds within the BLM White River Field Office area include leafy spurge (*Euphorbia esula*), whitetop (*Cardaria draba*), Russian knapweed (*Acroptilion repens*), Canada thistle (*Cirsium arvense),* diffuse knapweed (*Centaurea diffusa*), houndstongue (*Cynoglossum officinale*), spotted knapweed (*Centaurea maculosa*), musk thistle (*Carduus nutans*), yellow toadflax (*Linaria vulgaris*), tall whitetop/perennial pepperweed (*Lepidium latifolium*), and black henbane (*Hysocamus niger*). Problem weed species in the field office area include bull thistle (*Cirsium vulgare*), bluebur stickseed (*Lappula redowski*), and mullen (*Verbascum thapsus*) (BLM 1997a). The most common species found within the Project Area are houndstongue, leafy spurge, yellow toadflax, bull thistle, Canada thistle, and the invasive grass species, downy brome/cheatgrass (*Bromus tectorum*).

3.8.4 Rangeland Resources and Grazing

The Project Area occurs within two grazing allotment units including the Piceance Mountain (also referred to Ira Johnson use area) and Fawn Creek grazing allotment (also referred to as the C.W. Brennan grazing allotments). The Piceance Mountain Allotment is grazed annually, while meeting the minimum rest requirements as per the Grazing Management EIS

guidelines. These rest requirement dates have since been incorporated in the Colorado Standards for Rangeland Health. The rest dates for this allotment are broken down into three time periods; 03/25-06/15, 04/20-07/10, and 04/25-08/01, all of which are implemented one out of every three years (Hafkenschiel, M. personal communication. November 2003).

The Piceance Grazing Allotment is on 61% public land and supports 3,807 animal unit months (AUM). The minimum rest requirement dates for this unit are from 03/25-06/15 and from 04/25-07/20, one out of every 2 years (BLM 1997). A total of 10,612.1 acres of this grazing allotment are within the Project Area.

The Fawn Creek Allotment is a cattle allotment which has 19,125 public acres, supporting 959 AUMS. The minimum rest requirement dates for this unit are from 03/25-06/15 and from 04/25-07/20, one out of every 2 years (BLM 1997).

This allotment is divided into three separate areas. The first area is comprised of 5% public lands which provide 172 AUMs. The second area is comprised of 70% public lands and supports 64 AUMs. The third area is also comprised of 70% public land, but supports 553 AUMs. None of the three areas within the Fawn Creek Allotment have minimum resting requirements. A total of 6,613.3 acres of this grazing allotment are within the project area.

3.8.5 Wetlands and Riparian Areas

Wetlands are limited in the study area and occur mainly on the floodplains of major streams such as Piceance Creek, East and West Hunter Creek, and Willow Creek, where there are areas of shallow groundwater, which is partly influenced by flood irrigation for hay production. Wetlands also occur in side drainages in areas of groundwater discharge (springs and seeps) and in narrow bands on the sides of some streams. In order to identify the specific distribution and functions and values of wetlands in the Project Area, wetland delineations will be prepared for this project using field surveys and the methods and criteria of the U.S. Army Corps of Engineers 1987 Wetland Delineation Manual (COE 1987). Wetland delineations within the Project Area will be conducted by B&A in June of 2004. Most wetlands in the study area are wet meadows dominated by a mixture of grasses, sedges, and rushes, including reed canarygrass, Nebraska sedge, Richardson muhly, redtop, timothy, Baltic rush, streambank wheatgrass, foxtail barley, narrowleaf sedge, and spikerush. Other species include dandelion, clover, thistle, and sandbar willow.

Riparian vegetation in the area is dominated by grasses, including western wheatgrass, slender wheatgrass, and needlegrass, as well as several sedges and rushes. Shrubs, including big sagebrush, rubber rabbitbrush, and greasewood, are present but sparse (BLM 1982). This community is used extensively as the winter range for mule deer. Typical overstory vegetation includes box elder and narrowleaf cottonwoods. Understory vegetation is varied but typical species include sandbar willow, serviceberry, chokecherry, and skunkbrush (Steigers 1998). These riparian communities are important because they support higher population densities and greater diversity of both plant and animal species than any other

plant community in the Project Area (BLM 1994). Mule deer, cottontail rabbit, coyote, bobcat, ducks, geese, and other native birds find food and shelter in riparian communities.

3.9 WILDLIFE RESOURCES

The Figure Four Project Area supports a diversity of wildlife and wildlife habitats. Species occurrences are typically dependent on habitat availability, relative carrying capacities, and degree of existing habitat disturbance. The proposed Project Area supports approximately 17,280 acres of wildlife habitat and includes four primary wildlife habitat types. These habitat types correspond with the vegetation community types described in Section 3.8, and include pinyon-pine/juniper woodlands, montane shrub communities, sagebrush steppe, and aspen woodlands. Water resources (i.e., creeks, springs, and ponds) are limited within the greater Project Area. Where available, these areas provide important habitat value for wildlife.

3.9.1 General Wildlife

Approximately 53 species of mammals, 93 species of birds, and 9 species of reptiles and amphibians may occur in and around the Figure Four Project Area, either seasonally or year-round (Fitzgerald et al. 1994; Kingery 1998; Hammerson 1999). The study area for wildlife includes the Project Area, a two-mile buffer zone, and downstream aquatic drainages. The following discussion of baseline conditions focuses on key species, including big game, raptors, waterfowl, upland game, migratory birds and fish species. Special Status Species (threatened, endangered, and candidate) are discussed in Section 3.9.6.

3.9.2 Big Game

3.9.2.1 Elk

Elk historically ranged over much of central and western North America from the southern Canadian Provinces and Alaska south to the southern United States, and eastward into the deciduous forests. In Colorado, the species ranges throughout the western two-thirds of the state, generally at elevations above 6,000 feet. Elk are gregarious animals, with herds of more than 200 occurring in open habitats. In more heavily forested habitats, group sizes are typically smaller. Elk tend to migrate between summer and winter ranges. Elk summer range typically occurs at higher elevations. During the summer, elk are found primarily where steep slopes (15 to 30%) occur over flats, although ridge-tops are often used for bedding. Aspen woodlands also provide protective and foraging habitat for this species. Summer populations also tend to occur within 1/2-mile of a water source. During winter, elk move to lower elevations where they are found most often on south-facing slopes, primarily in pinyon juniper woodlands. Like other members of the deer family, this species relies on a combination of browse, grasses, and forbs, depending on their availability throughout the seasons.

Numerous landscape characteristics including elevation, topography, and vegetation provide ideal seasonal habitat for elk in the Figure Four Project Area. The steep sloping mountain

shrub habitat, along with the numerous aspen woodlands provide ideal foraging and bedding habitat, while also providing effective cover. Numerous springs also occur across the Figure Four area, providing elk easy access to water sources throughout the year.

The Colorado Division of Wildlife (CDOW) has defined various ranges for big game species (Appendix B). Elk from the portions of the Piceance Basin Herd Unit occupy much of the greater Project Area on a year-round basis (Figure 3-9). Approximately 17,280 acres of summer range, 8,184 acres of winter range and 4,085 acres of winter concentration areas exist within the Project Area. No severe winter range for elk has been identified in the Project Area.

3.9.2.2 Mule Deer

Mule deer occur throughout the mountains, forests, deserts, and brushlands of the western United States. Typical habitats include short-grass and mixed-grass prairies, sagebrush and other shrublands, coniferous forests and forested and shrubby riparian areas. In mountainous areas, mule deer usually are migratory, spending warmer months at higher elevations. During this time, mule deer prefer foraging on the succulent regrowth of forbs and the new twigs of trees and shrubs. As summer progresses and herbaceous plants mature and dry, their diet shifts more toward woody browse. Mule deer continue to forage on woody browse as they are driven down to foothill areas in winter.

In Colorado, mule deer are found statewide in all ecosystems. The Piceance Basin in northwestern Colorado possesses some of the highest densities of mule deer in the entire state. Mule deer from the Piceance Basin Herd Unit occupy all sections within the Figure Four Project Area throughout the summer (17,280 acres) (Figure 3-10). The mosaic of aspen woodlands, montane shrub, and sagebrush-steppe communities provides excellent cover and ideal foraging habitat for this species. In addition, spring-fed riparian woodlands also provide mule deer with a nearby water source and additional forage resources.

The majority of the Project Area occurs at elevations too high to support mule deer during winter months. However, mule deer winter range (202 acres) does extend into the northeast portion of the Project Area (T4S, R98W, Sec. 1) primarily along the Hunter Creek basin. In addition, mule deer severe winter range also exists near the confluence of Hunter Creek and Piceance Creek. Approximately 13 acres of severe winter range exist in the Figure Four Project Area in the Piceance Creek Valley bottom along the proposed Hunter Creek main gas gathering pipeline route.

3.9.3 Waterfowl and Upland Game Birds

Eight species of waterfowl and upland game birds occur or have been documented near the Project Area: Canada goose (*Branta canadensis*), mallard (*Anas platyrhynchos*), cinnamon teal (*Anas cyanoptera*), green-winged teal (*Anas crecca*), common merganser (*Mergus merganser*), mourning dove (*Zenaida macroura*), blue grouse (*Dendragapus obscurus*), and greater sage-grouse (*Centrocercus urophasianus*) (Kingery 1998). With the exception of the

greater sage-grouse, populations and habitats for these species are widely distributed throughout the state.

The upland game bird species of most concern in the Figure Four Project Area is the greater sage-grouse, which is classified as a Species of Special Concern by the CDOW. Sage-grouse are discussed in detail in Section 3.9.7 (Special Status Wildlife Species).

3.9.4 Raptors

The Figure Four Project Area provides potential foraging and/or breeding habitat for 16 species of raptors or birds of prey (Kingery 1998) (Appendix C). Although extensive data exist for cliff nesting raptors in the White River Field Office area, data for tree nesting species are somewhat limited. Tree nesting raptors are typically documented on a site specific/pre-development basis throughout the field office area. As a result, comprehensive nesting records for pinyon/juniper woodlands and aspen forests, are lacking. These woodlands occur intermittently throughout the Figure Four Project Area, and represent the potential nesting habitat. As no energy development has previously occurred in the Figure Four Project Area, and as the majority of the land in the area is privately owned, no previous raptor nest records for the Project Area were available.

In an attempt to determine how the proposed development may potentially affect raptor nesting habitat, on-site field evaluations were conducted at all proposed well pads, roads, and pipelines. To minimize the amount of disturbance to raptor nesting habitat, the BLM stipulated that a total of 27 proposed well pad locations, and associated roads and pipelines be moved as far from nesting habitat as possible. All aspen and pinyon-pine/juniper woodlands as well as all rock outcrops were determined to be potential nesting habitat in the Project Area. Therefore, the BLM stipulated that several proposed well pad locations and road and pipeline ROWs near these features be moved in an attempt to avoid or to minimize woodland disturbance as much as possible. A description of the wells that were relocated are provided in Table 3-18.

Table 3-18. Relocation of Well Pads for Avoidance of Raptor Nests

Pad #	Pad Location	Rationale for Pad Movement
7	NWSW 2-4S-98W	Avoid pinyon/juniper by moving pad west away from ridgeline
11	NWNW 7-4S-98W	Avoid aspen to west along access road and pad
19	NWSW 9-4S-98W	Avoid aspen along access road
50	SWSE 15-4S-98W	Avoid aspen grove to north by moving pad to south if possible
55	SWSW 16-4S-98W	From Pad #72 access road should run along east side of ridge to avoid aspens
56	SWSE 16-4S-98W	From split to Pad #77 keep road on east side of ridge to avoid aspens
62	NENW 18-4S-98W	Avoid aspen to north by moving pad to south as possible
64	NESW 18-4S-98W	Avoid aspens along access road route
72	NESE 20-4S-98W	Minimize aspen grove disturbance by moving access road west off of ridge
73	SWNE 20-4S-98W	Avoid aspen by moving pad as far west as possible
75	SWSE 21-4S-98W	Access road should be offset to west side of ridge still avoiding aspen stands
76	NWSE 21-4S-98W	Access road should be offset to west side of ridge still avoiding aspen stands
78	NENW 22-4S-98W	Avoid aspen grove to north
79	NWSW 22-4S-98W	Avoid aspen grove to north by moving pad south as possible
82	SWNE 22-4S-98W	Avoid aspen grove to NE, move pad SW if possible
90	SWSW 24-4S-98W	Avoid aspens to east by moving pad west if possible
94	SESE 25-4S-98W	Avoid aspen to west by moving pad east if possible
95	SWNE 25-4S-98W	Avoid aspen grove in saddle to the south by moving pad to north
99	SWSW 26-4S-98W	Avoid aspens if possible by moving pad to north; access pad from Pad #115
104	NWSW 27-4S-98W	Avoid aspen by moving pad to south as close to road as possible
105	SWSE 27-4S-98W	Move pad to north to avoid aspen to south
107	SENW 28-4S-98W	Avoid aspen groves as possible
108	NWSW 28-4S-98W	Avoid aspen and sagebrush by moving pad to south into serviceberry
109	NESE 28-4S-98W	Avoid aspen grove on N. side by moving pad to south if possible
114	SENE 29-4S-98W	Avoid aspen by moving pad to south and reroute top ridge road around pad
121	NENW 36-4S-98W	Avoid aspens to west by moving pad east as possible
122	SWNW 36-4S-98W	Avoid aspens to west by moving pad to east as possible

In May of 2004, Buys & Associates conducted a raptor nest inventory of 55 proposed well pad locations and associated road and pipeline ROWs plus a ¼ mile buffer. This inventory documented a total of 28 raptor nests (24 red-tailed hawk, 2 Cooper's hawk, and 2 unknown species). Of these nests, 17 were found to be active (14 red-tailed hawk, 2 Cooper's hawk, 1 unknown species). The majority of active nests (n = 16) occurred in aspen trees within mature aspen stands. One active nest occurred on a cliff face. No proposed well pad locations were within 1/8-mile of documented active raptor nests, however three proposed access road and pipeline ROWs fall within this buffer. In addition, 12 well pads, 6 access road ROWs, and 4 pipeline ROWs fall within ¼-mile of documented active raptor nests.

3.9.5 Fisheries

Surface waters directly associated with the Project Area include Piceance, Willow, and Hunter Creek. The CDOW has classified all streams in the vicinity of the Figure Four Project Area as having limited game fisheries potential and low resource value (Prenzlow 1998). Native fish in Piceance Creek include the speckled dace (*Rhinichthys osculus*) and either flannelmouth (*Catostomus latipinnis*) or mountain suckers (*Catostomus latipinnis*). Trout are present in Piceance Creek, however, numbers are low (Prenzlow 2003). Both Willow and Hunter Creeks are low-level spring fed creeks and are therefore of low resource value for fisheries. At higher elevations both creeks have minimal stream flow. However, this flow is sufficient to create riparian habitat. As these creeks approach their confluence with Piceance Creek, limited fisheries potential does exist.

3.9.6 Migratory Birds

The Migratory Bird Treaty Act (MBTA) as amended was implemented for the protection of migratory birds. Unless permitted by regulations, the MBTA makes it unlawful to pursue, hunt, kill, capture, possess, buy, sell, purchase, or barter any migratory bird, including the feathers or other parts, nests, eggs, or migratory bird products. In addition to the MBTA, Executive Order 13186 sets forth the responsibilities of Federal agencies to further implement the provisions of the MBTA by integrating bird conservation principles and practices into agency activities and by ensuring that Federal actions evaluate the effects of actions and agency plans on migratory birds.

Numerous migratory bird species occupy the Figure Four Project Area. Those migratory bird species that are Federally listed under the Endangered Species Act of 1973, as amended (ESA), or listed as Sensitive by the BLM, are addressed in Section 3.9.6. This section addresses migratory birds that may inhabit the proposed Figure Four Project Area, including those species classified as High-Priority birds by Partners in Flight. High-Priority species are denoted by an asterisk (*). Migratory bird species are addressed according to the habitat types found within the Figure Four Project Area.

Mountain Shrub

Bird species commonly associated with the mountain shrub communities include the common poorwill*, Virginia's warbler*, wild turkey, plumbeous vireo, orange-crowned

warbler, black-headed grosbeak, green-tailed towhee, Lewis' woodpecker*, and broad-tailed hummingbird.

Sagebrush Steppe

Bird species commonly associated with the desert shrub communities include the sage sparrow*, sage thrasher*, Brewer's sparrow*, vesper sparrow, western kingbird, horned lark, Say's phoebe, prairie falcon, and Swainson's hawk.

Pinyon-Juniper Woodlands

Bird species commonly associated with pinyon-juniper woodlands include the broad-tailed hummingbird*, gray flycatcher*, Clark's nutcracker*, pinyon jay*, juniper titmouse*, black-throated gray warbler*, western scrub jay, Bewick's wren, ash-throated flycatcher, hairy woodpecker, mountain chickadee, white-breasted nuthatch, chipping sparrow, western meadowlark, mourning dove, bushtit, northern and loggerhead shrike, blue-gray gnatcatcher and Say's phoebe.

Aspen Woodlands

Bird species commonly associated with aspen woodlands include the broad-tailed hummingbird*, violet-green swallow*, house wren, Lincoln's sparrow, white-crowned sparrow, dark-eyed junco, mountain bluebird, western wood-pewee, warbling vireo, and white-breasted nuthatch.

Riparian Habitats

Bird species commonly found in riparian habitats include, western kingbird*, broad-tailed hummingbird*, eastern kingbird, northern flicker, yellow warbler, Bullock's oriole, hermit thrush, cordilleran flycatcher and Wilson's warbler.

3.9.7 Special Status Wildlife Species

3.9.7.1 Federally Threatened, Endangered or Candidate Species

Bald Eagle (Haliaeetus leucocephalus)

As of the July 12, 1995 Federal Register, the bald eagle is no longer classified as Endangered and has been downlisted by the USFWS to the status of Threatened in the lower 48 states. The species is believed to be recovering across its range.

Bald eagle habitat is typically associated with food source concentrations. These areas include major rivers that remain unfrozen whereby fish and waterfowl are available, and near ungulate winter ranges that provide carrion (Montana Bald Eagle Working Group 1990). Near the Project Area, concentrations of bald eagles occur mainly along the White River to the north and Colorado River to the south. However, bald eagles have not been observed

roosting or nesting in the Project Area. A map of known bald eagle activity areas is provided in Figure 3-11. The closest documented bald eagle nest is located 4.2 miles southwest of the Project Area near the west fork of Parachute Creek (CDOW-NDIS 2003).

Colorado River Endangered Fishes

USFWS has determined that any federally authorized depletion from the Upper Colorado River Basin (UCRB) has an adverse affect on the listed Colorado River Endangered Fishes (BLM 1994). Annual depletions associated with the project include an annual maximum of 125 acre/feet to be taken from Piceance Creek. These waters are contained within the UCRB. The Recovery Plan for the UCRB addresses the major threats associates with these fisheries, including: loss and modification of habitat from additional dams, flow reductions, water contamination, and the continued proliferation of exotic fishes in these rivers. The White River downstream from Rio Blanco Lake, which includes the confluence with the Piceance Creek drainage system, is classified both as an endangered species fishery and a limited game fishery.

Endangered fishes potentially affected by the proposed action include; the Colorado pikeminnow (*Ptychocheilus lucius*), humpback chub (*Gila cypha*), razorback sucker (*Xyrauchen texanus*) and bonytail chub (*Gila elegans*). The White River is used throughout the year by the Colorado pikeminnow; however, razorback sucker, humpback chub, and bonytail chub do not inhabit the White River and would therefore only be affected indirectly by depletions leading towards the downstream Green and Colorado Rivers. Negative cumulative impacts affecting the Colorado pikeminnow primarily would consist of the minor, but incremental, increase in erosion and sediment yield that could occur due to surface disturbance associated with construction of the proposed well pads, access roads, and pipelines. These impacts would incrementally add to water quality effects (and therefore, fishery effects) of other past, present and future land use projects within the Cumulative Impact Assessment Area.

Greater Sage-Grouse (Centrocercus urophasianus)

The greater sage-grouse is an important game bird found in the Piceance Creek area. Greater sage-grouse, as the name implies, are restricted to sagebrush habitats. The greater sage-grouse is considered a BLM Species of Special Concern and has also been petitioned for federal listing as Threatened or Endangered (FR 04-8870, April 2004). Factors involved in the declines in both the distribution and abundance of greater sage-grouse include permanent loss, degradation, and fragmentation of sagebrush-steppe habitat throughout the western states including Colorado (Heath et al. 1996, Braun 1998); however no single causative factor has been identified, and combinations of multiple factors are probably responsible in most instances. It has been conservatively estimated that at least one-half of the original area occupied by sage-grouse is no longer capable of supporting this species on an annual basis (Braun et al. 1976, Braun 1995).

Recently, the number of active leks in the Piceance Basin has greatly decreased (BLM 1994). Previously active leks occurred across the Cathedral Bluffs, Roan Plateau, and north of Piceance Creek near the Greasewood Compressor Station. According to CDOW records, less than half of the previously identified leks are currently active. Numerous factors including range management treatments, energy development, drought, and predation may have contributed to this decline.

In an attempt to determine how the proposed development may potentially affect sage-grouse habitat, on-site field evaluations were conducted at all proposed well pads, roads, and pipelines. To avoid or minimize the disturbance and fragmentation of sage-grouse habitat in the Figure Four Project Area, a total of 8 proposed well pad locations, and associated roads and pipelines were moved. All contiguous sagebrush steppe habitat as well as all riparian areas were determined to be potential sage-grouse habitat in the Project Area. A description of relocation of well pads is provided in Table 3-19.

Table 3-19. Relocation of Well Pads for Avoidance of Sage Grouse

Pad	Pad Location	Findings
66	NWNW 19-4S-98W	Avoid sagebrush habitat by moving pad as far west as possible
67	SESW 19-4S-98W	Avoid primary sage grouse habitat by moving pad south as close to road as possible
68	SWSE 19-4S-98W	Avoid primary sage grouse habitat by moving pad south as close to road as possible
71	SWSW 20-4S-98W	Avoid primary sage grouse habitat by moving pad south as close to road as possible
105	SWSE 27-4S-98W	Avoid dense sagebrush on top by moving pad to north as possible w/out clearing aspens
108	NWSW 28-4S-98W	Avoid aspen and sagebrush by moving pad to south into serviceberry
112	SWSW 29-4S-98W	Avoid sagebrush habitat by moving pad east as close to road as possible
116	SENW 35-4S-98W	Avoid sage grouse habitat by moving pad to south near main road

The Figure Four Project Area lies on the western edge of the Roan Plateau, southeast of the Cathedral Bluffs and north of Skinner Ridge. Both active and inactive sage-grouse leks have been documented in these areas. Greater sage-grouse habitat is found throughout the southern portions of the Project Area (T4S – R98W Sections 7, 19-20, 26-29, and 34-35). Sage-grouse have been observed, and suitable nesting, brooding, and lek habitat occurs throughout the sagebrush steppe vegetation community found in the Project Area. CDOW records indicate that 2 brooding areas (i.e., wet areas such as meadows, springs, ponds and streams which all function as important brood rearing sites), and 5 production areas (two miles around an active lek) exist within a two-mile radius of the Project Area (Figure 3-12)(CDOW-NDIS 2003). In addition, site visits identified potential brooding habitat along

the riparian corridors of Hunter and Willow Creeks. The entire Project Area is included within greater sage-grouse winter and overall range (CDOW-NDIS 2003). No sage-grouse critical winter range exists in the Project Area.

3.9.7.2 BLM Sensitive Species

Table 3-20 summarizes the BLM Sensitive Species with the potential to occur in the Figure Four Project Area. Specifically, the table addresses the habitat types used by these Sensitive species, a determination of whether or not the habitat(s) occurs within the Project Area, and a determination of whether or not the individual species and/or their habitat(s) would be affected by the Proposed Action.

Table 3-20. Habitat Types Used by BLM Sensitive Wildlife Species

Common Name	Scientific Name	Habitat Used By Species	Is Habitat Present in the Figure Four Project Area?	Will Proposed Action Affect the Species and/or Habitat of the Species?
Townsend's big-eared bat	*Corynorhinus townsendii*	Roosting – caves Foraging – desert shrub/fir-pine	Roosting – NO Foraging - YES	Species – NO Habitat - NO
Fringed Myotis	*Myotis thysanodes*	Roosting – caves Foraging – desert-shrub/fir-pine	Roosting – NO Foraging – YES	Species – NO Habitat – NO
Yuma Myotis	*Myotis yumanensis*	Roosting – caves Foraging – open water	Roosting – NO Foraging –NO	Species – NO Habitat – NO
Northern Goshawk	*Accipiter gentilis*	Nests in pinyon juniper woodlands adjacent to clearings or wetlands	YES[1]	Species – NO Habitat – YES[1]
Barrow's Goldeneye	*Bucephala islandica*	Rivers and bays	NO	Species – NO Habitat – NO
Ferruginous Hawk	*Buteo regalis*	Nests in isolated pinyon juniper trees and on ground adjacent to open treeless areas	NO	Species – NO Habitat – NO
Black Tern	*Chlidonias niger*	Marshy ponds	NO	Species – NO Habitat – NO
Long-billed Curlew	*Numenius americanus*	Dry grassland; Winter - marshes and fields	NO	Species – NO Habitat – NO
White-faced Ibis	*Plegadis chihi*	Nests in low tree and reeds adjacent to marshes and ponds	NO	Species – NO Habitat – NO
Sharp-tailed Grouse	*Tympanuchus phasianellus Columbian*	Open grasslands or brushlands with patches or rows of trees	YES	Species – NO[2] Habitat – NO[2]
Bluehead Sucker	*Catostomas discobolus*	Headwater, streams, large rivers	NO	Species – NO Habitat – YES[3]
Flannelmouth Sucker	*Catostomas latipinnis*	Riffles, runs, eddies and backwaters of streams and rivers	NO	Species – NO Habitat – YES[3]
Mountain Sucker	*Catostomas platyrhynchus*	Cool, clear streams with clean rubble or sandy substrate	NO	Species – NO Habitat – YES[3]

Common Name	Scientific Name	Habitat Used By Species	Is Habitat Present in the Figure Four Project Area?	Will Proposed Action Affect the Species and/or Habitat of the Species?
Plains Topminnow	*Fundulus sciadicus*	Clear water in quiet pools of small creeks or backwater areas of large rivers that have submergent vegetation.	NO	Species – NO Habitat – YES[3]
Colorado River Cutthroat Trout	*Oncorhynchus clarki pleuriticus*	Headwaters, willows, riparian	NO	Species – NO Habitat – YES[3]
Midget Faded Rattlesnake	*Crotalus viridis concolor*	Rocky, arid areas	NO	Species – NO Habitat – NO
Northern Leopard Frog	*Rana pipiens*	Lakes, rivers, marshes, wetlands, beaver complexes	NO	Species – NO Habitat – NO
Great Basin Spadefoot	*Spea intermontana*	Pinyon-juniper woodlands, sagebrush, wetlands fed by springs	YES	Species – YES[4] Habitat – YES[4]

[1] Northern Goshawk nest sites generally occur in coniferous and mixed forests on gentle slopes with a northern or eastern aspect, on sites lacking an understory, and near clearings. Migrants and winter resident goshawks occur in all types of coniferous and riparian habitats and occasionally in shrubland habitats. An informal, pedestrian raptor nest inventory survey was completed by B&A within a 1/4-mile radius of the proposed well pad locations. No goshawk nests were documented within the vicinity of the proposed well pads during this inventory, however suitable nesting habitat is found there. Based on this information, construction of the Figure Four well pads and road/pipeline routes may adversely impact individual goshawks through habitat loss or temporary displacement from hunting grounds, but the action is not likely to result in a loss of viability on the planning area, nor cause a trend to federal listing or a loss of species viability rangewide. As such, this species is not discussed further in this EA.

[2] Although habitat for the sharp-tailed grouse occurs in the Figure Four Project Area, current ranges of the species do not exist in or near the Project Area. As such, the project would have no effect on the species and sharp-tailed grouse are not discussed further in this EA.

[3] For fishery resources, water needed for gas drilling would incrementally add to Colorado River depletions that have occurred/will occur for past, present and future projects requiring water in the Piceance Creek watershed. Negative cumulative impacts primarily would consist of the minor, but incremental, increase in erosion and sediment yield that could occur due to surface disturbance associated with construction of the proposed well pads, access roads, and pipelines. These impacts would incrementally add to water quality effects (and therefore, fishery effects) of other past, present and future land use projects within the [insert name of] Cumulative Impact Assessment Area. These actions may adversely impact individual Sensitive fish species through habitat degradation, but the action is not likely to result in a loss of viability on the resource area, nor cause a trend to federal listing or a loss of species viability rangewide. As such, these species are not discussed further in this EA.

[4] Construction of the Figure Four Project Area well pads, access roads, and pipeline ROWs may adversely impact individual Great Basin Spadefoot through habitat loss, but the action is not likely to result in a loss of viability on the resource area, nor cause a trend to federal listing or a loss of species viability rangewide. As such, this species is not discussed further in this EA.

3.10 CULTURAL RESOURCES

Information for this section was provided by Metcalf Archaeological Consultants (Metcalf Archaeological Consultants 2003, 2004). As archaeological sites are confidential information, locations of archaeological resources within the Project Area are not available for public review. The sections below provide a general description of the Project Area's cultural resource significance.

3.10.1 Cultural Overview

The cultural-chronological sequence represented in the Northern River Colorado Basin, including the Figure Four Project Area, includes the Paleoindian, Archaic, Formative, and Protohistoric Eras. The earliest inhabitants of the region are representative of the Paleoindian Era (about 11,500 B.C. to about 6400 B.C.), where several traditions are defined by projectile point types or complexes. This era is best characterized by low population densities, high mobility, a significant focus on large mammal procurement, and region- and continent-wide consistency in settlement and subsistence patterns (Husband 1984).

The Archaic Era (c.a. 6400 B.C. – A.D. 300) is characterized by a shift in the subsistence strategy away from dependence on large mega-fauna such as mammoth and a more broad spectrum approach. The approach involves the dependence on a foraging subsistence strategy, emphasizing smaller game such as now extinct species of bison, elk and dear and seasonally exploiting a wide spectrum of plant and some smaller animal species such as rabbits and squirrels in different ecozones. There is an apparent increase in overall population densities though peoples were still highly mobile. There are indications that there was a trend toward more intensive and long-term use of local resources.

The Formative Era (c.a. A.D. 300 – 1300) is characterized by the introduction and expanding use of the bow and arrow instead of the lance and dart, less emphasis on hunting of bison and more emphasis on deer, elk, big horn sheep, antelope and small mammals. The subsistence practices continue to emphasis exploitation of a broad range of vegetal food stuffs such as chenopodium and amaranthus with evidence of maize entering the diet. The presence of corn cobs from Douglas Creek, to the west of the Project Area, suggests the possibility of limited horticulture in Douglas Creek but, corresponding evidence is currently lacking from the archaeological record in the Piceance Basin.

The Protohistoric Era (*c.a.* A.D. 1300 – 1881) is characterized by the apparent abandonment of horticulture and the entry into the area of Numic speaking peoples, referred to as Ute in the area south of the Yampa River, including the Piceance Basin. The subsistence economy resembles the Archaic era with an emphasis on hunting, gathering and foraging in a series of seasonal rounds based on the availability of resources as they come into season. This may include moving from lower elevations where the winters are spent in the association with big game wintering areas to higher elevations in conjunction with deer and elk herd summer pastures. The period includes early contact with Euro-American explorers and fur trappers and concludes with the establishment of Ute Reservations. The Ute acquired the horse in the

early years of the 18th century which increased mobility allowing hunting trips to the front range of Colorado where the Ute observed and adopted many items of the plains horse culture (Rockwell 1998). Trade items become increasingly important and are seen with increasing frequency in the archaeological record.

The Historic period in the region began with the first Euro-American explorers in the area, followed closely by trappers, government surveyors, miners, and ranchers. The first documented European explorers to come north of the Colorado River were the Spanish priests Domniguez and Escalante who ascended from the Colorado River along Debeque Creek, crossed the uplands west of the Project Area and descended the Douglas Creek drainage in 1776. The mining boom in the Rockies and farther west in Utah drove the expansion of the railways and fostered the development of agriculture, ranching, and other local industry that primarily supported mining activities. These activities caused increasing tensions with the Ute which resulted in a series of treaties dated 1863 (Evans), 1868 (Hunt) and the Brunot Treaty of 1873 in an attempt to appease the mining interests, primarily in the San Juan Mountains to the south, and keep the peace. However, increasing tensions on the White River Agency reservation came to a head in 1879 with the killing of agent Nathan Cook Meeker and eleven male employees and the Battle of Milk Creek where the Ute kept the army detachment sent to the White River Agency at the request of agent Meeker pinned down for several days while the remainder of the White River band fled south to the Uncompahgre Plateau (Sprague 1957, Werner 1985). Historic occupation of the Project Area since the Ute removal in 1881-82 has been primarily geared toward ranching, agriculture, and hunting.

3.10.2 Cultural Resources Site Identification

File searches were completed through the Office of Archaeology and Historic Preservation's Compass on-line database and at the BLM White River Field Office in August and September 2003 and April 2004. Approximately 50 previous projects were reported in the area files searched. Many of these projects were oil shale, pipeline, and gas well-related, but also included inventories for fence lines and stock ponds completed by BLM.

The records search indicated few cultural resources were previously reported in the Figure Four Project Area. Two previously recorded sites were identified along the proposed Hunter Creek main gas gathering pipeline route. The first, Hunter Creek Road, considered to be a historic/modern road, was previously determined to be ineligible for listing on the National Register of Historic Places (NRHP). The second site, a rock shelter site and rock structure of unknown age, was not previously evaluated in terms of eligibility for listing on the NRHP (Metcalf Archaeological Consultants 2004). Other cultural resources previously identified within the Project Area are prehistoric isolated finds consisting of flakes or quartzite cobbles. There was one biface tip recorded and collected (Metcalf Archaeological Consultants 2003).

Class III cultural resources inventories were conducted following the file searches. The Figure Four Well Field area was surveyed in August and September 2003. Twenty acre blocks were surveyed around all of EnCana's proposed well pad locations. Proposed access

roads and pipelines were also surveyed along 100- and 150-foot wide corridors depending on whether or not the pipelines and roads would be co-located. Based on previous work in the area, very few cultural resources were anticipated. Cultural resources anticipated included prehistoric isolated finds, very small lithic scatters, and possibly some prehistoric and historic hunting camps. In total, six isolated finds were discovered and recorded during the Class III cultural resources inventory of the Figure Four well field area. These finds were located on ridgetops in generally open settings, on heavily eroded soils, and consisted of chert flakes, a fragment of a knife or projectile point, and a small projectile point dating to the late Formative or Protohistoric Era. Based on the small number of isolated finds recorded during the inventory, and the heavily eroded and deflated character of the soils, there does not appear to be any potential for intact buried cultural deposits in the well field portion of the Project Area.

The Class III cultural resources inventory of the Hunter Creek main gas gathering pipeline corridor was carried out in April 2004. The area covered extended 7.1 miles north northeast from the Figure Four well field boundary to the proposed pipeline's junction with the existing and previously disturbed TransColorado pipeline corridor. The survey corridor was 200 feet wide centered on the proposed pipeline centerline. Inventory of the Hunter Creek pipeline corridor resulted in discovery and documentation of one historic trash scatter, one historic and modern dump associated with a historic homestead largely outside of the area of potential effect (APE), one prehistoric isolated find, and one historic isolated find. In addition, the two previously recorded sites mentioned above were revisited and re-evaluated.

During the field evaluation, the previously recorded rock shelter and structure site contained no observable cultural materials, but may contain intact buried artifacts. Metcalf Archaeological Consultants has recommended additional site testing to further evaluate its potential for inclusion on the NRHP. Until further testing of that site is completed, it is recommended as potentially eligible for inclusion on the NRHP and disturbance near this site should be avoided. Hunter Creek Road itself is a historic/modern road, dating back as far as 1884, but has been substantially modified and upgraded over the years and lacks physical integrity and other characteristics that would warrant inclusion on the NRHP (under eligibility criterion D). The historic trash scatter and dump sites were evaluated and recommended as not eligible for inclusion on the NRHP. The isolated finds are by definition considered not eligible for inclusion on the NHRP.

3.11 LAND USE AND AREAS OF CRITICAL ENVIRONMENTAL CONCERN

3.11.1 Land Use

The Project Area lies within the BLM's White River Field Office area south of Piceance Creek Road, a sparsely populated region that is characterized by family-owned ranches, large undeveloped properties owned by oil companies, and vast tracts of public lands administered by the BLM. A map identifying general federal and private land ownership in the Figure Four Project Area and surrounding region is shown on Figure 2-1.

Current land uses within and adjacent to the Project Area consist of wildlife habitat, dispersed recreation (particularly seasonal hunting), cattle ranching, and limited oil and gas exploration and production. Within the Project Area, a total of thirteen natural gas wells have been drilled or are have been permitted and will be drilled in the near future on federal and fee minerals. Many of these locations are served by access roads that have already been upgraded. Apart from these gas well locations, there are very few developed land uses in the Project Area, giving it an open and wild character. There are no commercial businesses and only a few occupied residences and hunting cabins on private lands in the Project Area. There is also limited irrigated agriculture in the valley bottoms on private lands in and around the Project Area. More intensive agriculture, consisting of hay meadows, is present adjacent to Piceance Creek along a portion of the proposed pipeline route at the north end of the Project Area. These farmlands are not considered to be prime or unique, however. The Project Area includes four grazing allotments, which are described in detail in Section 3.7 – Vegetation.

There are no designated wilderness areas, BLM wilderness study areas, or wild and scenic rivers (nor rivers eligible for designation) within the Project Area. Areas of Critical Environmental Concern (ACECs) are described below in Section 3.11.2.

Existing man-made structures and disturbance to the landscape in the Project Area include a few residences and ranching-related structures, a limited number of buried pipelines, and access roads and valve structures along these pipeline routes. There are presently about ten exploratory natural gas wells that were recently developed in the Project Area. A limited number of high and low voltage transmission lines are also present. Routine maintenance and inspection activities associated with existing gas exploration and production, pipelines and transmission lines generate modest vehicle traffic and human activity in and around the Project Area.

Surface and subsurface estates in the Project Area are administered by both the BLM and private interests. The Figure Four project would develop natural gas resources on 17 federal natural gas leases and four private (fee) mineral leases. Table 3-21 identifies all leases that would be developed as part of the proposed project and their respective acreages.

The BLM identified a few existing and permitted rights-of-way across BLM administered lands within the Figure Four Project Area. These include a major interstate natural gas pipeline owned by Rocky Mountain Natural Gas and TransColorado along EnCana's proposed gas pipeline route from the lower Hunter Creek Valley north to the proposed CIG sales point, an electric transmission line owned by White River Electric Association, which is located in the Hunter Creek Valley, and various unpaved road rights-of-way within and adjacent to the Figure Four well field.

The BLM's Resource Management Plan envisions development of federal oil and gas resources in the White River Field Office area (WRRA) in a manner that provides reasonable protection for other resource values. Oil and gas leasing and development in the WRRA are subject to various restrictions, based on three categories or levels of protection (BLM 1997a):

- Non-discretionary lands, such as wilderness study areas, where no leasing is permitted (83,720 acres);
- Areas available for leasing with special stipulations to protect other resources values (1,552,958 acres). These include No Surface Occupancy, Timing Limitations,
- Controlled Surface Use intended to avoid or minimize adverse impacts to sensitive resources; and
- Areas available for leasing with standard lease terms (168,486 acres).

Table 3-21. Natural Gas Leases in the Figure Four Unit

Lease	Legal Description Township 4S, Range 98W	Acreage	Pads
COC-25793	SECTION 12: SWNE, SESW	160.11	34,35,37,38
COC-56834	SECTION 7: NE, E/2NW, Lots 1-2 SECTION 8: All SECTION 9: All	2248.37	19,20,21,22, 15,16,17,18, 13,14
COC-56835	SECTION 11: NE, SW SECTION 15: N/2, N/2SW, NWSE SECTION 16: N/2, N/2S/2, S/2SW, SWSE	1360.0	33,30,54,57, 49,52,51,53
COC-58684	SECTION 17: ALL SECTION 20: ALL SECTION 21: W/2NE, NW, S/2 SECTION 22: S/2N/2, N/2SW,SESW,SE	2280.0	58,60,61,80,81,82,74,75, 76,77,71,72,73
COC-60751	SECTION 19: E/2, E/2W/2, LOTS 1-4	641.910	66,67,68,69
COC-60752	SECTION 28: ALL SECTION 29: ALL	1280.0	111,112,113,114,107,108, 109,110
COC-64832	SECTION 26: ALL SECTION 27: ALL	1280.0	103,104,105, 98,99,100,101, 102
COC-64833	SECTION 24: ALL SECTION 25: ALL	1280.0	88,89,90,91, 92,93,94,96, 97
COC-64834	SECTION 14: N/2, S/2SW,SE	599.96	44,45,46,47, 48,49
COC-64835	SECTION 35: ALL SECTION 36: ALL	1440.0	121,125,124, 123,122,116, 117,119,120
COC-64836	SECTION 22: N/2NE, SWSW SECTION 23: ALL	760.00	83,84,85,86, 87
COC-65570	SECTION 13: ALL	640.00	39,40,41,42, 43
COC-65571	SECTION 1: LOT 2, SWNE, W/2SE SECTION 2: LOT 1,2, S/2NE,SE	639.99	2,3,8,9, 10
COC-65573	SECTION 10: ALL SECTION 11: NW, SE	960.00	21,31,32,23, 24,25,26,27
COC-65574	SECTION 12: N/2SW, SWSW, SE, N/2N/2, SENE, S/2NW	560.00	36
COC-60570	SECTION 1: SENE, S/2NW, E/2SE; LOTS 1,3,4	1120.47	1,4,5
COC-66587	SECTION 2: LOTS 3,4, S/2NW,SW	320.00	6,7
FEE	SECTION 18: ALL SECTION 16: SESE SECTION 15: S/2S/2, NESE		50,78,12,59, 62,65,64

Lease	Legal Description Township 4S, Range 98W	Acreage	Pads
	SECTION 14: N/2SW SECTION 22: N/2NW SECTION 21: E/ 2NE		

Since stipulations and lease terms are focused on protection of specific resource values, descriptions of stipulations and lease terms applicable to the Figure Four Project are provided in the various resource discussions in Section 4 of this EA.

With respect to county land use planning policies and objectives, the Rio Blanco County Master Plan and Garfield County Comprehensive Plan and respective county Zoning Ordinances contain specific policy statements and regulations addressing land uses related to natural resource development, including natural gas extraction.

The Rio Blanco County Master Plan acknowledges the importance of oil and gas extraction to the local economy and tax base, but also identifies potential land use conflicts between gas access road and pipeline construction with existing land uses, such as agriculture and wildlife habitat, and expresses concern about the spread of noxious weeds in the county due to pipeline construction. Stated objectives and policies in the Plan are summarized to acknowledge that, given its economic importance, natural gas development in the county should continue, provided impacts to other land uses and county infrastructure are mitigated appropriately. In terms of zoning, the Project Area lies within "Multiple Use" and "Agricultural" zones. These zones can accommodate natural gas development through special use and conditional use permitting (Rio Blanco County Master Plan 1999). According to the Rio Blanco County Development Department, EnCana presently holds a county-wide Special Use License for its gas development activities, which would authorize development of the proposed project, provided the conditions in the license are complied with (Whalin 2003).

The Garfield County Comprehensive Plan recognizes the legal right of mineral estate holders to extract and develop mineral resources in Garfield County. However, the county also seeks to balance the rights of the mineral estate holder with those of surface owners through implementation of appropriate Mitigation, where legally enforceable by the county. Examples of Mitigation applied to natural gas projects where Garfield County had jurisdiction include landscaping or screening to reduce visual impacts, appropriate road improvements and signage where warranted, and drainage improvements to protect surface and groundwater (Plan 2000). The portion of the Project Area within Garfield County lies within areas zoned as "Resource Lands" (the private parcels) and "Open Space" (BLM administered public lands). According to the Garfield County zoning ordinance, natural gas extraction facilities can be authorized in Resource Land and Open Space zones with either conditional or special use permits.

3.11.2 Areas of Critical Environmental Concern

The Dudley Bluffs Area of Critical Environmental Concern ACEC is located to the east of the proposed natural gas pipeline on the east side of Piceance Creek Road. The Dudley Bluffs ACEC comprises 1,630 acres and was established by the BLM because of the presence of two federally threatened plant species, the Piceance twinpod (*Physaria obcordata*) and the Dudley Bluffs bladderpod (*Lesquerella congesta*). The northern end of the proposed gas pipeline route is located on the west side of Piceance Creek Road, about 100 feet west of this ACEC. The portion of the proposed pipeline route located near the Dudley Bluffs ACEC will be inventoried to verify no threatened plants would be affected.

The Ryan Gulch ACEC is located to the west of the proposed natural gas pipeline route in T2S, R97W on the west side of Piceance Creek. The Ryan Gulch ACEC, which comprises 1,440 acres, was also established by the BLM because of the presence of the federally threatened Piceance twinpod and the Dudley Bluffs bladderpod. The proposed project pipeline route would be located approximately ½ mile east of this ACEC.

In general, the BLM's management objectives for these ACECs are to protect populations of the two threatened plant species within the ACEC. Surface disturbing activities that would directly or indirectly impact these plant populations would be prohibited (BLM 1997c).

3.12 RECREATION

The Project Area is located on a combination of private property and public lands administered by the BLM, and offers open space where visitors can participate in primitive or unconfined recreational activities in a relatively undisturbed setting. In terms of its recreational setting, the Figure Four Project Area is remote and relatively inaccessible. Although there are some existing natural gas wells present, the Project Area is still natural in its overall appearance. There are no developed recreational facilities, such as campgrounds or picnic areas within the Project Area. Overall, the BLM-administered portion of the Project Area features minimal evidence of visitor management and site modifications, which adds to its primitive and wild character. Since the majority of roads that serve the Project Area are generally gated and unimproved, the number of recreational visitors to the area at any given time is typically very low.

The Project Area offers abundant dispersed recreational opportunities that range from backcountry camping and hunting, to hiking, sightseeing, and wildlife observation. Recreational off-highway vehicle use and camping also occur in the Project Area, and are usually associated with hunting in the fall. The Project Area lacks logistical proximity to towns and winter road maintenance on Project Area roads does not occur. As a result, access is generally poor for snowshoeing, snowmobiling, and cross-country skiing in winter.

The Recreation Opportunity Spectrum (ROS) is the BLM's framework to inventory, plan and manage recreational opportunities. The ROS is divided into six classes, ranging from essentially natural, low-use areas (resource-dependent recreational opportunities) to highly developed, intensive use areas (facility/vehicle-dependent recreational opportunities). The

BLM portion of the Project Area is part of the White River Extensive Recreation Management Area, which is managed to provide unstructured recreational opportunities for a diversity of uses (BLM 1997b). Although the BLM White River Field Office has not assigned an ROS Class specifically to the Project Area, its recreational setting most closely resembles the Semi-Primitive Motorized (SPM) ROS Class. Management objectives assigned to SPM areas typically stress maintenance of their natural appearance, with only subtle evidence of management controls (minimal use of signs and interpretive facilities). Motor vehicle use and consumption of natural resources is allowed, although management effort is directed to reduce the impact of utility corridors, rights-of-way, and other surface disturbing projects.

In the BLM's White River Field Office area as a whole, visitor use is estimated to be 150,000 visits annually with big game hunting being the dominant recreational activity (BLM 1997b). The Project Area is located primarily in the Colorado Division of Wildlife's Game Management Unit (GMU) 22. Big game hunting for elk, mule deer, black bear, and mountain lion occurs in the fall and winter months, with the majority of hunting taking place in the months of October through December. In 2002, a total of 539 elk were harvested by 2,766 hunters who visited GMU 22. Similarly, a total of 1,045 mule deer were harvested by 1,969 hunters who visited GMU 22 in 2002. Total recreation days calculated by the Colorado Division of Wildlife for GMU 22 in 2002 were 13,280 for elk and 7,490 for deer. The number of hunters that specifically used the Figure Four Project Area portion of GMU 22 is unknown, however. Black bear and mountain lion hunting is also common in GMU 22, although the number of hunters pursuing bear and mountain lion is smaller. The bear season occurs in September and the mountain lion season runs from mid-November to March or until the harvest quota for the unit is reached. In 2002, 5 bear were harvested and in 2001, 16 mountain lions were harvested from GMU 22 (Colorado Division of Wildlife 2002). Hunting for blue grouse also occurs in the Project Area from September through mid-November. BLM has issued permits to commercial outfitters who guide hunting parties into various portions of the WRFO area. There are three permitted outfitter territories in the vicinity of the Project Area, as shown on Figure 3-13. The LOV Ranch and Vaughn Ranch outfitter permit areas physically overlap with the Project Area.

The southern portion of the Project Area, from about the Garfield County line south, consists almost entirely of private property owned by oil companies and ranching interests. Recreational activities on these private lands generally occur only by permission of the landowners, although some privately owned oil company properties are open to the public and are used for recreational purposes. In some cases, hunting rights are leased to outfitters, while in other cases, limited public hunting is allowed.

In the northwestern part of the Project Area, there are two permitted outfitter areas for commercial hunting trips. These are referred to by BLM as the Vaughn Ranch permit area, which includes a total of 16,051 acres, and the LOV Ranch permit area, which includes a total of 8,596 acres. The holders of these permits have exclusive rights to lead commercial hunts on BLM lands in their respective permit areas.

3.13 VISUAL RESOURCES

In terms of general visual character, the Project Area consists of long, undulating ridges dissected by short ravines, gullies, and small valleys. Hillsides feature sand-colored rock outcrops mixed with green and gray vegetation. The photograph presented on the cover of this Environmental Assessment is a view of the Project Area from a ridgetop perspective that is representative of the regional landscape.

The majority of the Project Area is located on BLM-administered public lands that have been inventoried for visual resources and assigned Visual Resource Management (VRM) classifications. These VRM classifications correspond to visual management objectives for the area and also indicate the level of acceptable visual changes the BLM will permit for a given project or activity. In general, areas assigned a VRM I classification receive the greatest protection from visual impacts, while VRM Class IV areas are permitted to receive the greatest degree of visual impacts or changes. The entire BLM-administered portion of the Project Area has been assigned a VRM Class III designation by BLM (BLM 1997a).

According to BLM guidelines that address visual resource management, in VRM Class III areas, the objective is, "to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape" (BLM 1986).

3.14 TRANSPORTATION

Principal vehicular access to the Project Area from the south is from Colorado State Route (SR) 13 from Rifle along the Interstate 70 corridor. Access to the Project Area from the north is provided by SR 64 from Meeker and Rangely. From both SRs 13 and 64, the Project Area is reached via Piceance Creek Road (County Road 5) and then unpaved county, BLM, and private access roads. Figure 3-14 provides a map showing existing local roads that presently serve the Project Area. Transportation of workers and shipment of equipment and supplies to the Project Area would require use of these roads by automobiles and trucks. There is no rail service in the Piceance Creek valley. The nearest rail service is located along the Interstate 70 corridor passing through Rifle.

The only access route directly into the Project Area would be from County Road 5. Vehicles traveling from the I-70 corridor and Rifle would take SR 13 north into Rio Blanco County and then turn northwest on County Road 5. From Meeker or Rangely, vehicles would take SR 64 to County Road 5 and then proceed southeast. Vehicles then would primarily follow County Road 26 (gravel surface) along Black Sulfur Creek to County Road 69 (dirt surface), which parallels Dry Gulch southwest into the Project Area. Alternative routes into the Project Area from County Road 5 include the Hunter Creek Road and the Willow Creek Road, both of which are private dirt roads. Due to rugged terrain there is no vehicle access directly into the Project Area from Garfield County to the south.

Once vehicles have entered the Project Area, various existing dirt roads are available for upgrade by EnCana to provide access to many of the proposed well locations. At present there are approximately 121 miles of existing roads within the proposed well field area. Other proposed well locations are not presently served by roads and construction of new access routes would be necessary. A description of the mileage of existing roads that would be upgraded and new roads that would be constructed is presented in Section 2.2.1.3. A map showing the locations of proposed upgrades of existing roads and new road locations is presented on Figure 2-6.

Average daily traffic numbers were compiled from the Colorado Department of Transportation (CDOT) and the Rio Blanco County Road and Bridge Department for major roads that would be used to access the Project Area. These traffic volumes are presented in Table 3-22. These traffic counts reveal a modest increase in traffic volumes from 1989 - 2002. In general, although they have increased substantially in terms of percentage since 1989, traffic volumes along Highways 13 and 64 and along Piceance Creek Road remain modest and are well below their respective carrying capacities. Highways 13 and 64 are maintained by the Colorado Department of Transportation, while Piceance Creek Road and other county roads in the area are maintained by the Rio Blanco County Road and Bridge Department. There are no Garfield County roads in the Project Area. Traffic on County Road 5 is generally light, with minimal traffic volume and congestion. Truck trips associated with ranching activity, other oil and gas operations, as well as soda ash and bicarbonate operations to the north of the Project Area all contribute to truck and vehicle traffic on County Road 5.

Most of the roads on BLM lands within the Project Area are primitive and intended for access to areas for dispersed recreational and fire-fighting purposes. Off-highway vehicle (OHV) use is "limited" to existing travel routes for the period of October 1st to April 30th each year to protect wildlife resources (BLM 1997a). Most of the recreational OHV use in the Project Area is associated with hunting in the fall.

In addition to recreational visitation to the Project Area and surrounding region, local ranchers and oil and gas operators use the current road system for grazing management activities, maintenance of and access to private property, and existing mineral exploration and development activities.

Table 3-22. Average Daily Traffic on Roads Serving the Project Area

Road	1989	2002	2002 % Trucks	Change 1989 - 2002
Piceance Creek Road (County Road 5) near Jct. SR 64	94	274	33%	191%
Piceance Creek Road (County Road 5) near Jct. SR 13	134	261	33%	95%
Route 13 between Rifle and south end of Piceance Creek Road	1,300	1,992	11.8%	53%

Route 64 between Rangely and north end of Piceance Creek Road	610	722	33.4%	18%
Route 64 between Meeker and north end of Piceance Creek Road	1,300	1,479	15.1%	14%

Sources: Rio Blanco County Road and Bridge Department 2003, Colorado Department of Transportation, 2003.

3.15 SOCIOECONOMICS

The Figure Four Project Area is located in Rio Blanco and Garfield Counties, Colorado. The following is a description of the demographics, local economy, and community services in the two counties that may be affected by the Figure Four Project.

3.15.1 Demographics

Population estimates for 2002 projected by the U.S. Census Bureau were compiled for communities in Rio Blanco and Garfield counties. Population centers within a reasonable commuting distance of the Project Area include Meeker with a 2002 population of about 2,249, Rangely with a population of about 2,107, Rifle with a population of about 7,387, Parachute with a population of about 1,050, and Silt with a population of 2,072 (U.S. Census Bureau 2002). Meeker and Rangely are located in Rio Blanco County, along State Route 64, north of the Project Area, while Rifle, Parachute, and Silt are located in Garfield County along the Interstate 70 corridor to the south of the Project Area. Figure 2-1 shows the geographic locations of these communities.

Over the last 5 years, these communities have experienced varying degrees of population growth or decline. Communities along the Interstate 70 corridor in Garfield County, including Rifle, Parachute/Battlement Mesa, and Silt have experienced population growth in response to increases in construction employment associated with accelerated development of real estate and resort facilities and to growth in tourism-related trade and service employment in Glenwood Springs and adjacent Pitkin County (Aspen-Snowmass). From 1997 to 2002, the population of Garfield County increased from about 38,894 to 47,441 residents (21.9 percent). Population in Rio Blanco County actually decreased from 1997 to 2002 from 6,322 to 6,042 (-4.1 percent) from 1997 to 2002 (Colorado Department of Local Affairs 2002).

3.15.2 Local Economy and Employment

Rio Blanco and Garfield Counties have experienced broad economic swings over the last 25 years. During the late 1970s to the early 1980s, these counties experienced considerable economic growth associated with the energy boom. From 1983 to 1990, the collapse in the local oil shale industry and the regional energy bust resulted in high unemployment and severe economic hardship for many area residents. Since 1990, the economies of Rio Blanco and Garfield Counties have diversified and grown steadily as real estate and resort development and increased tourist and recreational visitation have increased economic activity and employment opportunities. This economic growth is particularly pronounced in

Garfield County around Glenwood Springs, but is also evident in Meeker as visitation for hunting and other recreational pursuits has increased the use of lodging and dining establishments and other tourism-related businesses in town.

Major sources of employment in Rio Blanco County include the mining and oil and gas industries; local, state, and federal government; retail trade; and services. Major sources of employment in Garfield County include assorted professional services (finance and insurance, real estate and lending, education, health care, information technology/media); retail and wholesale trade; tourism-related services, local, state, and federal government; and the construction industry (Colorado Department of Labor and Employment 2003). Table 3-23 provides a breakdown of nonagricultural sources of employment by economic sector in Rio Blanco and Garfield Counties. Rio Blanco and Garfield Counties are currently experiencing low unemployment rates. According to the Colorado Department of Labor and Employment, the November 2003 unemployment rates in Rio Blanco and Garfield Counties were 3.2 and 3.5 percent, respectively, which is below the State of Colorado as a whole at 5.6 percent (Colorado Department of Labor and Employment 2003).

Table 3-23. Sources of Nonagricultural Employment by Sector

Employment Sector	Rio Blanco County		Garfield County	
	Number of Jobs	Percent of Total	Number of Jobs	Percent of Total
Mining, Oil and Gas	499	19	389	2
Construction	200	8	3,014	15
Manufacturing	58	2	400	2
Trade (Wholesale and Retail)	270	10	3,419	17
Transportation and Utilities	92	3	523	3
Professional Services[a]	206	7	4,997	25
Services	301	11	3,405	17
Government	1,075	40	3,848	19
Total	**2,701**	**100**	**19,995**	**100**

Source: Colorado Department of Labor and Employment 2003

[a] Professional Services include finance, insurance, real estate, information/media, education, and health care.

3.15.3 Community Emergency Response Services

The proposed project could increase the demand on community facilities and local government services in Rio Blanco and Garfield Counties should emergencies occur

requiring medical, fire, or law enforcement assistance. The following is a brief description of emergency services available in both counties.

3.15.3.1 Rio Blanco County

In Rio Blanco County, law enforcement services are provided by the Rio Blanco County Sheriff's Department. Fire protection services are provided by the Rio Blanco Fire Protection District, which is stationed in Meeker. Medical services are provided by Pioneers Hospital in Meeker; ambulance service to Pioneers Hospital is available. In situations requiring specialized medical expertise, helicopter service is available to St. Mary's Hospital in Grand Junction.

3.15.3.2 Garfield County

Law enforcement services in unincorporated areas of Garfield County are provided by the Garfield County Sheriff's Department. Medical services in Rifle are provided at Claggette Memorial Hospital and Grand River Medical Clinic; ambulance service is available to the hospital. Individuals requiring hospitalization or sophisticated medical services must travel to Rifle, Glenwood Springs, or Grand Junction.

3.15.4 Local Government Fiscal Conditions and Revenues from Oil and Gas Activities

Oil and gas operations contribute considerable revenue to various local, state, and federal government entities through payment of various royalties and taxes. The following types of revenues are typically generated by oil and gas operations similar to the Proposed Project.

3.15.4.1 Property Tax Revenue

Among the most important sources of revenue in Rio Blanco and Garfield Counties are property taxes levied on real property. This revenue source is used by the counties to fund a wide variety of services and community facilities. Given their generally high assessed value, oil and gas and other types of industrial operations often contribute a significant portion of a county's property tax base.

It is interesting to note that the property tax bases of the two counties are significantly different in their size and composition. In Rio Blanco County, 61 percent of total assessed valuation is related to oil and gas extraction. In addition, other natural resource extraction operations are responsible for an additional 15 percent of the total assessed valuation in the county. Public utilities comprise 10 percent of the county's assessed value, while residential, commercial, industrial, agricultural and vacant lands combined make up the remaining 14 percent. Total assessed valuation in Rio Blanco County was approximately $340 million in 2002 (Colorado Department of Local Affairs 2002a).

By contrast, in Garfield County, total assessed valuation is more evenly distributed between residential (31 percent), commercial (17 percent), and oil and gas operations (28 percent). Public utilities (6 percent), vacant lands (12 percent), industrial (4 percent), and agriculture

lands (2 percent) comprise the remaining sources of assessed valuation in Garfield County. Total assessed valuation in Garfield County was approximately $916.3 million in 2002 (Garfield County Assessor 2002). This difference in the composition of the property tax bases of the two counties reflects the contrast between the more diversified economy of Garfield County, which is based more on commercial activity, tourism, and real estate, and the dominance of valuable oil and gas and other natural resources industries in Rio Blanco County.

In Rio Blanco County, local school districts and the community college in Rangely receive the largest portion of property tax revenue, followed by the county government, various special service districts (including local parks and recreation, fire protection, library services, water and pest control, the local cemetery), and the town governments of the cities of Meeker and Rangely. In total, approximately $12.8 million in property tax revenue was distributed to these entities in Rio Blanco County in 1997 (Colorado Department of Local Affairs 2002a).

In Garfield County, local school districts and Colorado Mountain College receive the largest share of property tax revenue, followed by county government, special service districts (hospital, parks and recreation, cemeteries), fire protection districts, water and sanitation districts, and the local community governments. In total, approximately $51.3 million in property tax revenue was distributed to these entities in Garfield County in 2002 (Colorado Department of Local Affairs 2002a).

3.15.4.2 Federal Mineral Lease Royalties

Federal mineral lease royalties are collected from oil and gas extraction operations located on federally administered public lands. At present, the federal royalty rate for gas is based on a step scale that varies by production rate. Federal mineral leasing regulations require the return of 50 percent of royalties collected from these operations to the state of origin. The 50 percent federal share of the royalties collected goes to the U.S. Bureau of Reclamation (40 percent) and the U.S. Treasury (10 percent). In the State of Colorado, state law (CRS 34-63-102) directs the distribution of the state's share of royalty funds to the counties of origin, individual municipalities within those counties, the State School Fund, the Colorado Department of Local Affairs, and the Colorado Water Conservation Board according to a complex formula. In 2002, federal mineral lease royalty payments to the State of Colorado for all minerals amounted to $43.8 million (Colorado Department of Treasury 2002).

3.15.4.3 Sales and Use Tax Revenue

Sales taxes are paid by oil and gas operations when purchases of equipment, materials, or supplies are made in the local area. Examples of purchases that generate sales tax revenue include gravel, pipe, fuel, and other supplies purchased locally. Like property tax revenue, sales and use tax revenues are used by local cities and counties to fund a wide variety of important local services and community facilities.

Currently, the sales tax rate in Rio Blanco County is 6.5 percent (2.9 percent state, 3.6 percent county). In 2002, total net taxable sales in Rio Blanco County amounted to

approximately $49 million, which yielded sales tax revenues of approximately $1.4 million for the State of Colorado and $482,000[a] for Rio Blanco County specifically (not including the towns of Meeker and Rangely)(Colorado Department of Revenue 2002, Rio Blanco County Sales and Use Tax Department 2004).

Use tax is collected by Rio Blanco County on materials purchased outside of the county (e.g., materials delivered by vendors from outside the county to operations in Rio Blanco County). Rio Blanco County charges a 3.6 percent use tax on these materials. In 2002, Rio Blanco County collected approximately $812,000[a] in use tax revenue (Rio Blanco County Sales and Use Tax Department 2004). There is no use tax levied in unincorporated Garfield County.

The sales tax rate in unincorporated Garfield County is 3.9 percent (2.9 percent state, 1 percent county), with rates higher in various incorporated cities in the county. For unincorporated portions of Garfield County, sales taxes collected in 2002 amounted to about $3.2 million for the county specifically. Overall, taxable sales in all of Garfield County produced approximately $19.5 million in sales tax revenue for the State of Colorado in 2002 (Colorado Department of Revenue 2002).

3.15.4.4 Severance Tax

The State of Colorado levies a severance tax against the proceeds of the sale of various minerals produced in the state. In 2002, total severance taxes paid to the State of Colorado for production of oil and gas amounted to approximately $48.9 million. The severance tax rate applied to oil and gas is $10,750 plus 5.0 percent of gross income in excess of $300,000 (Colorado Department of Revenue 2002).

[a] Sales and use tax revenues reported by the Rio Blanco Sales and Use Tax Office were unaudited figures and round off for presentation purpose.

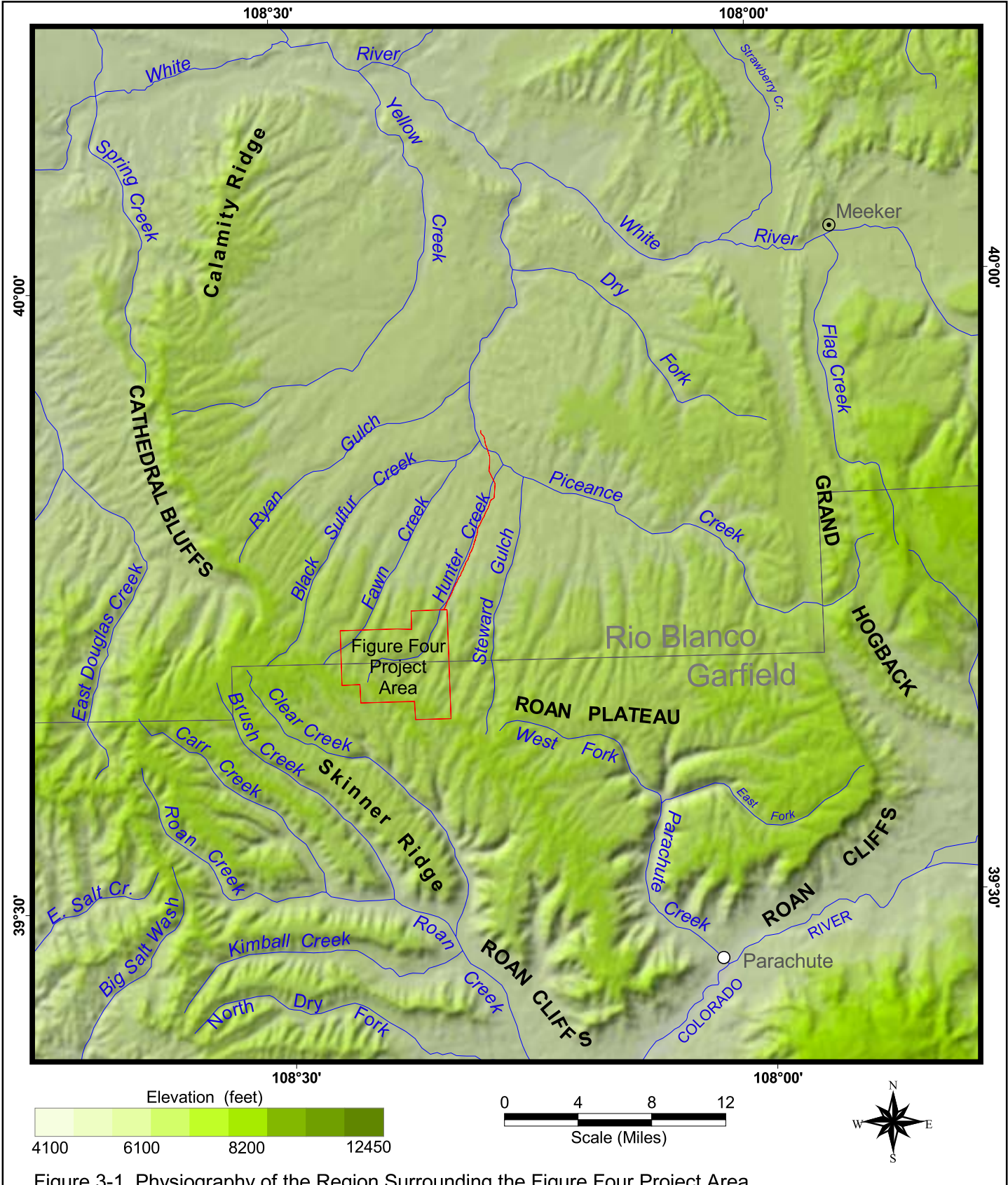


Figure 3-1. Physiography of the Region Surrounding the Figure Four Project Area

Era	System	Series	Stratigraphic Unit	Unit Thickness (feet)	Physical Description	Hydro-geologic Unit	Saturated Thickness (feet)	Hydrologic Characteristics
Cenozoic	Tertiary	Eocene	Uinta Formation	0-1,400	Silty sandstone, siltstone and marlstone	Upper Piceance Basin Aquifer		Conductivity range <0.2 to >1.6 ft/day; yield 1 to 900 gpm; transmissivity 610-770 ft^2/day
			Green River Formation	As much as 5,000	*Parachute Creek Member* keragenous, dolomitic marlstone and shale 500-1,800 ft	Mahogany confining unit		
					Anvil Points Member shale, fine-grained sandstone and marlstone 0-1,870 ft	Lower Piceance Basin Aquifer		Conductivity range <0.1 to >1.2 ft/day; yield 1 to 1,000 gpm; transmissivity 260-380 ft^2/d
					Garden Gulch Member claystone, siltstone, clay-rich oil shale and marlstone 0-900 ft	Confining Unit		
					Douglas Creek Member siltstone, shale and channel sandstone 0-900 ft			
			Wasatch Formation	About 5,000	Shale and lenticular sandstone			
		Paleocene	Fort Union Formation	Very Thin	Coarse-grained sandstone	Fort Union aquifer		
Mesozoic	Cretaceous	Upper Cretaceous	Mesaverde Group	Averages 3,000 may be >7,000	Fox-Hills Sandstone, Lewis Shale, Williams Fork Formation, Iles Formation: sandstone interbedded shale and coal	Mesaverde aquifer	<500-2,000	
			Mancos Shale	More than 7,000	Mainly shale but Frontier Sandstone may be local aquifer	Mancos confining unit		

Figure 3-2. Hydrostratigraphic Column for the Piceance Basin

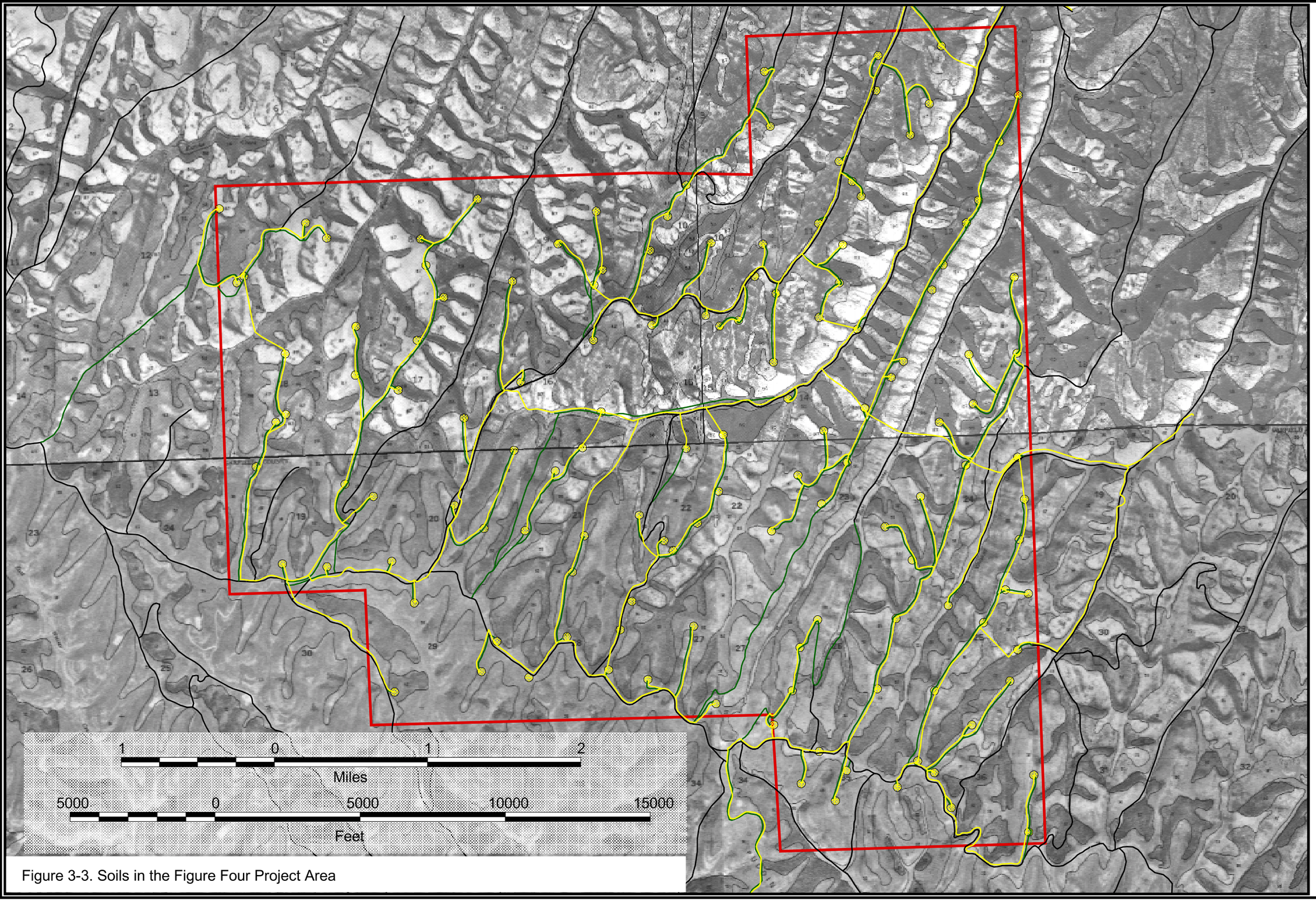


Figure 3-3. Soils in the Figure Four Project Area

Soils Map for the Figure Four Project Area

- Existing Roads
- Proposed Roads
- Proposed Pipelines
- Proposed Well Pads
- Well Field Boundary

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W
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S

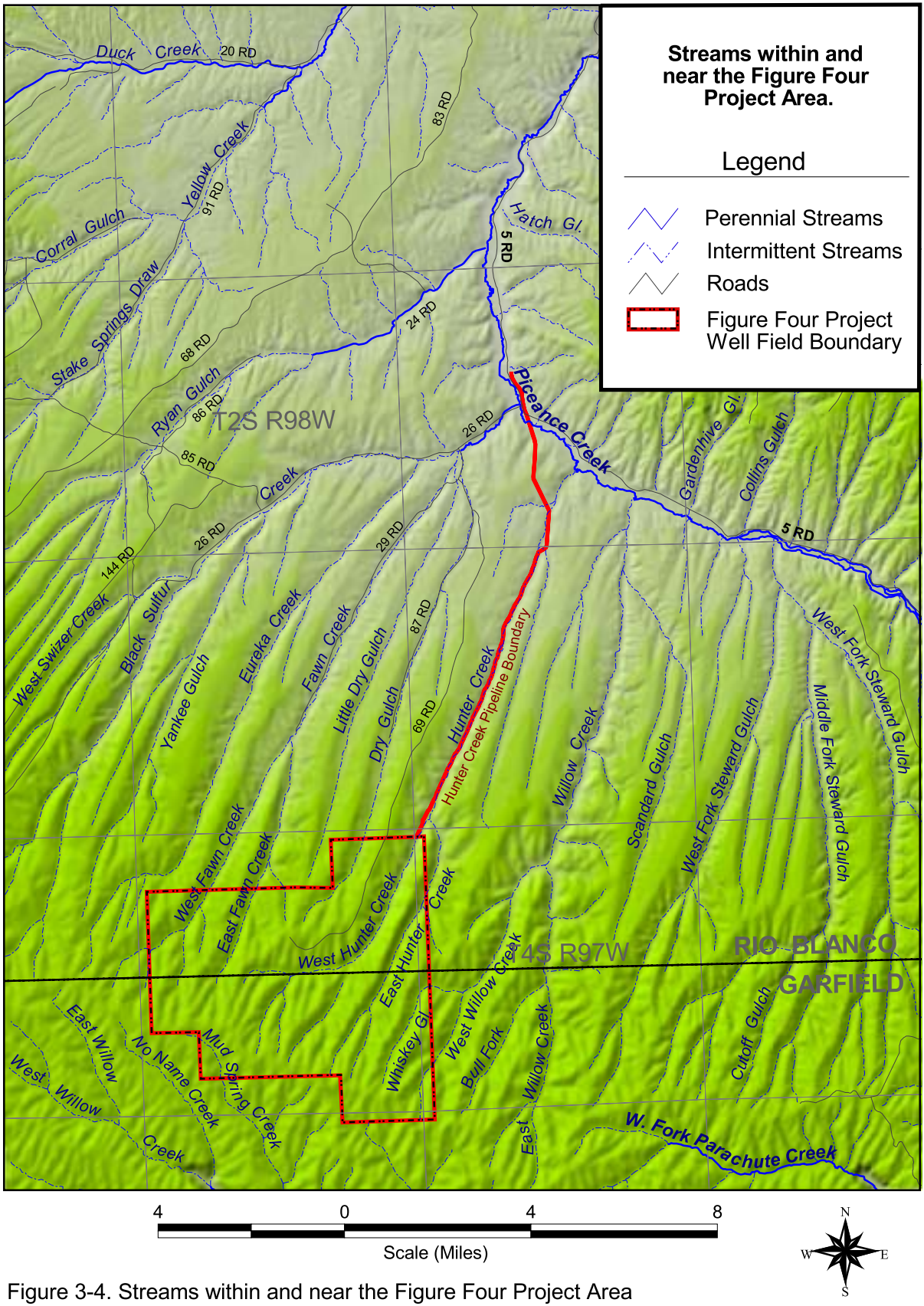
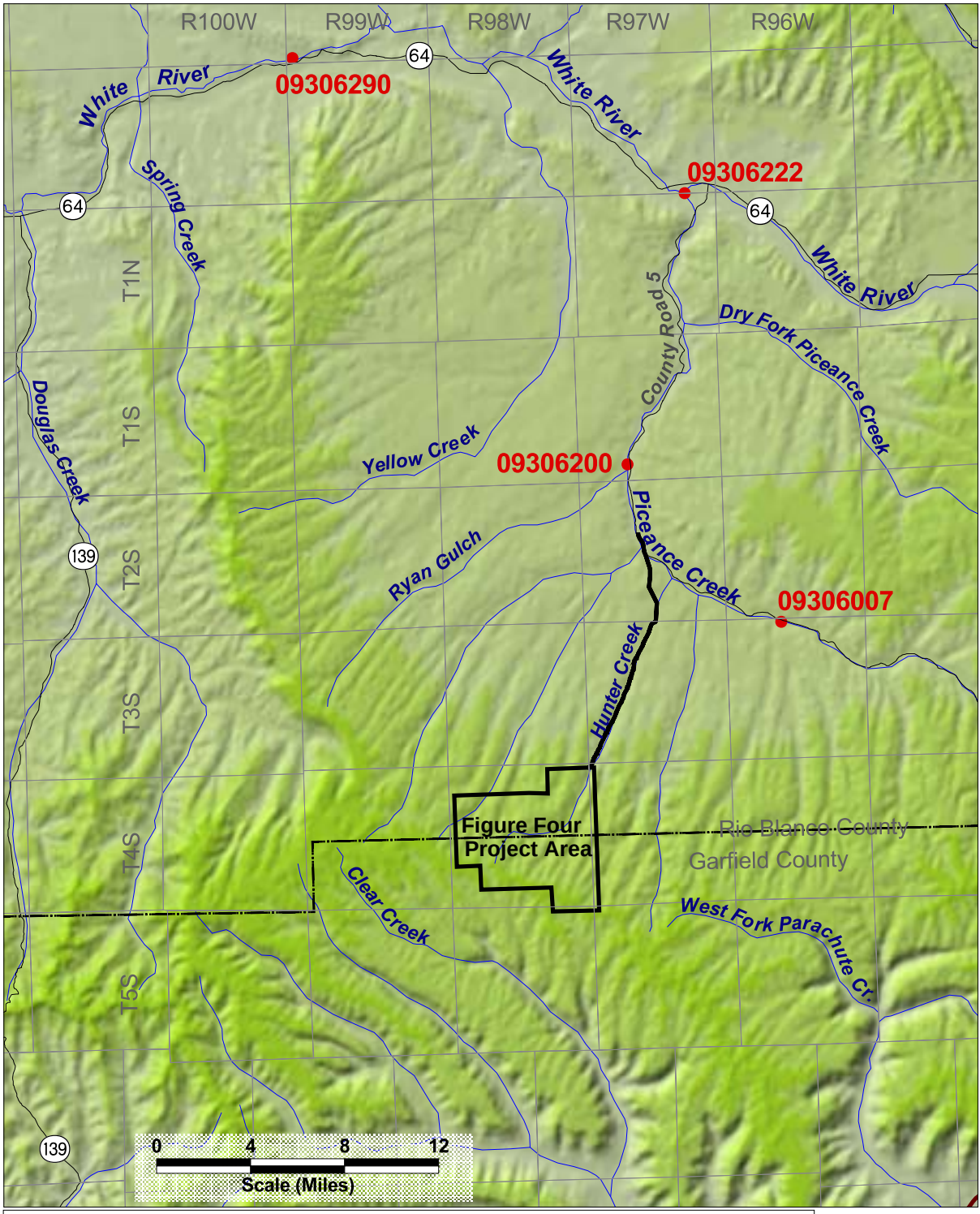


Figure 3-4. Streams within and near the Figure Four Project Area



USGS Gaging Stations	ID Number	Location
	09306290	White River Below Boise Creek
	09306222	Piceance Creek at White River
	09306200	Piceance Creek Below Ryan Gulch
	09306007	Piceance Creek Below Rio Blanco

N
W
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Figure 3-5. Location of USGS Gaging Stations

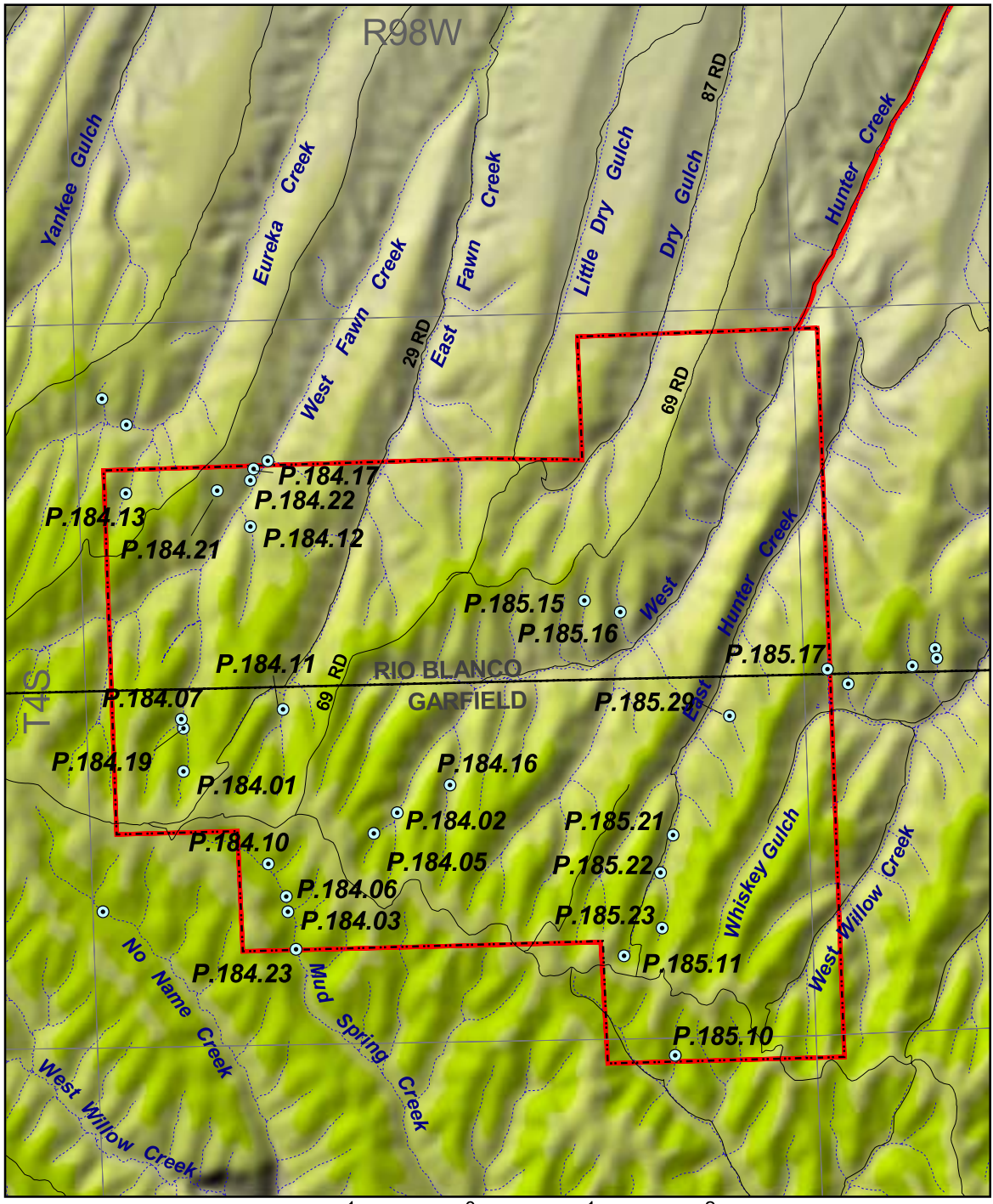

Figure 3-6. Springs in the Figure Four Project Area

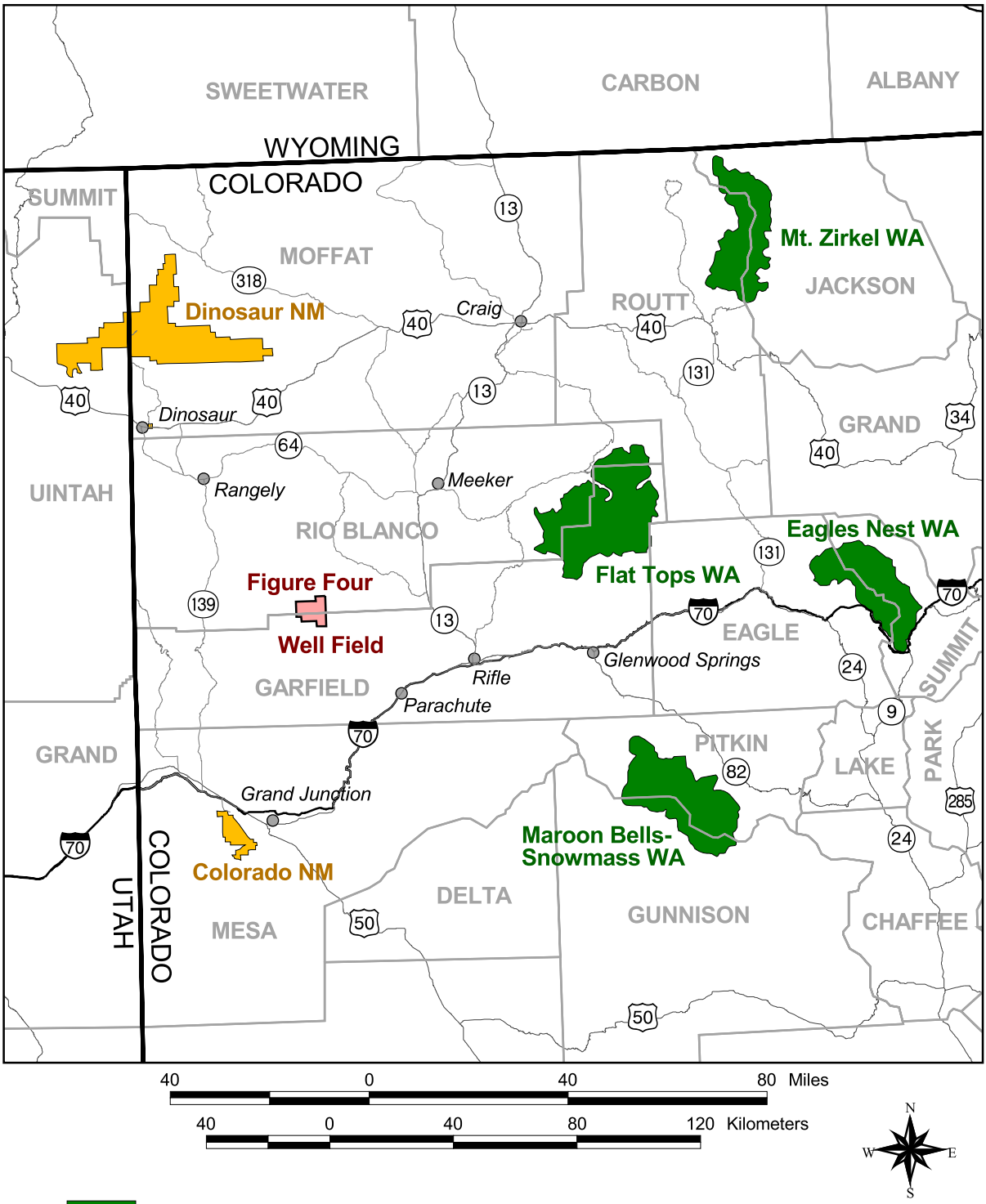

Figure 3-7. Location of Class I Wilderness and Class II Monument Areas

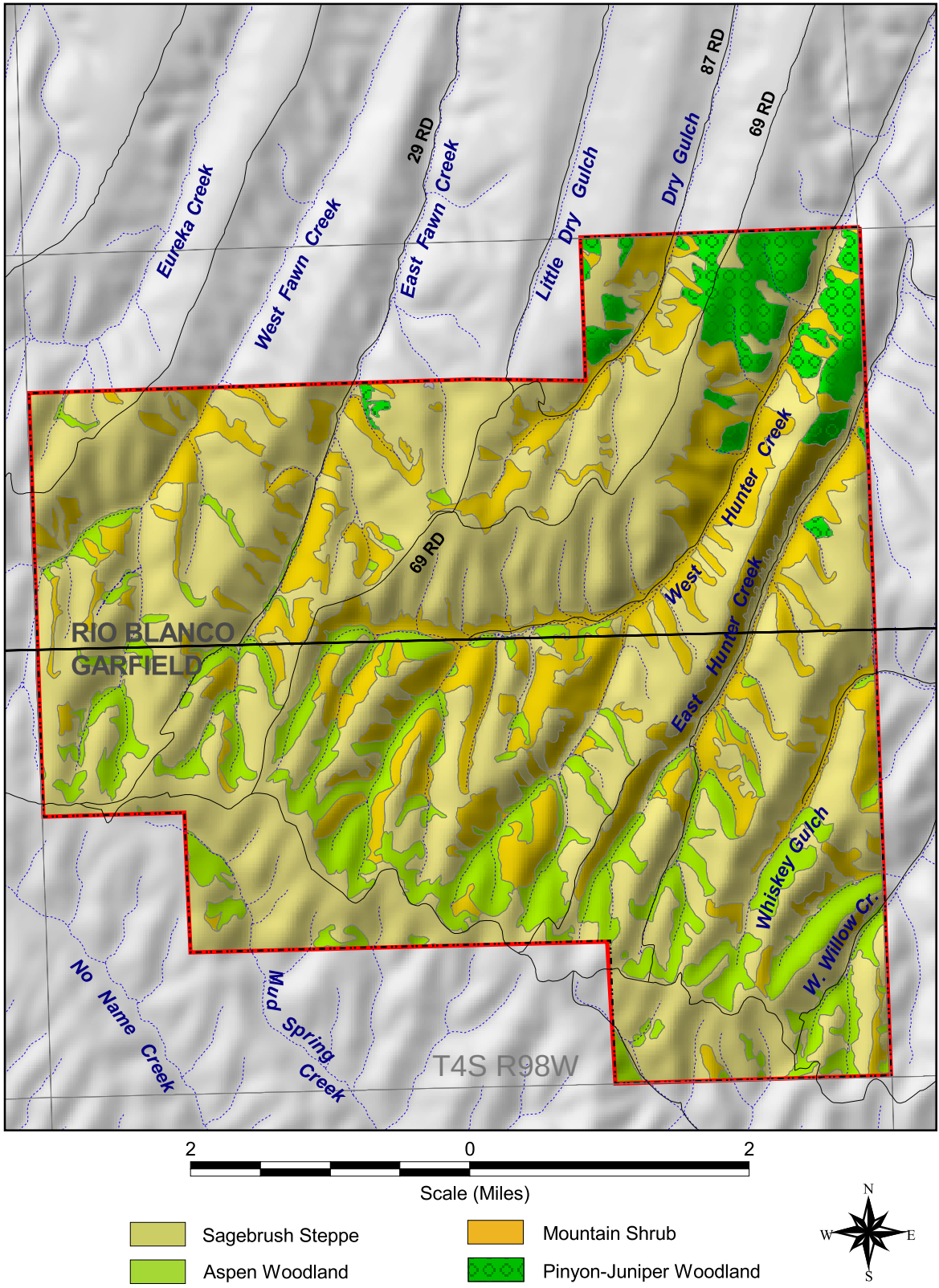

Figure 3-8. Dominant Vegetation Communities Within the Project Area (BLM, 2003)

Elk Activity Areas
Figure Four Project Area

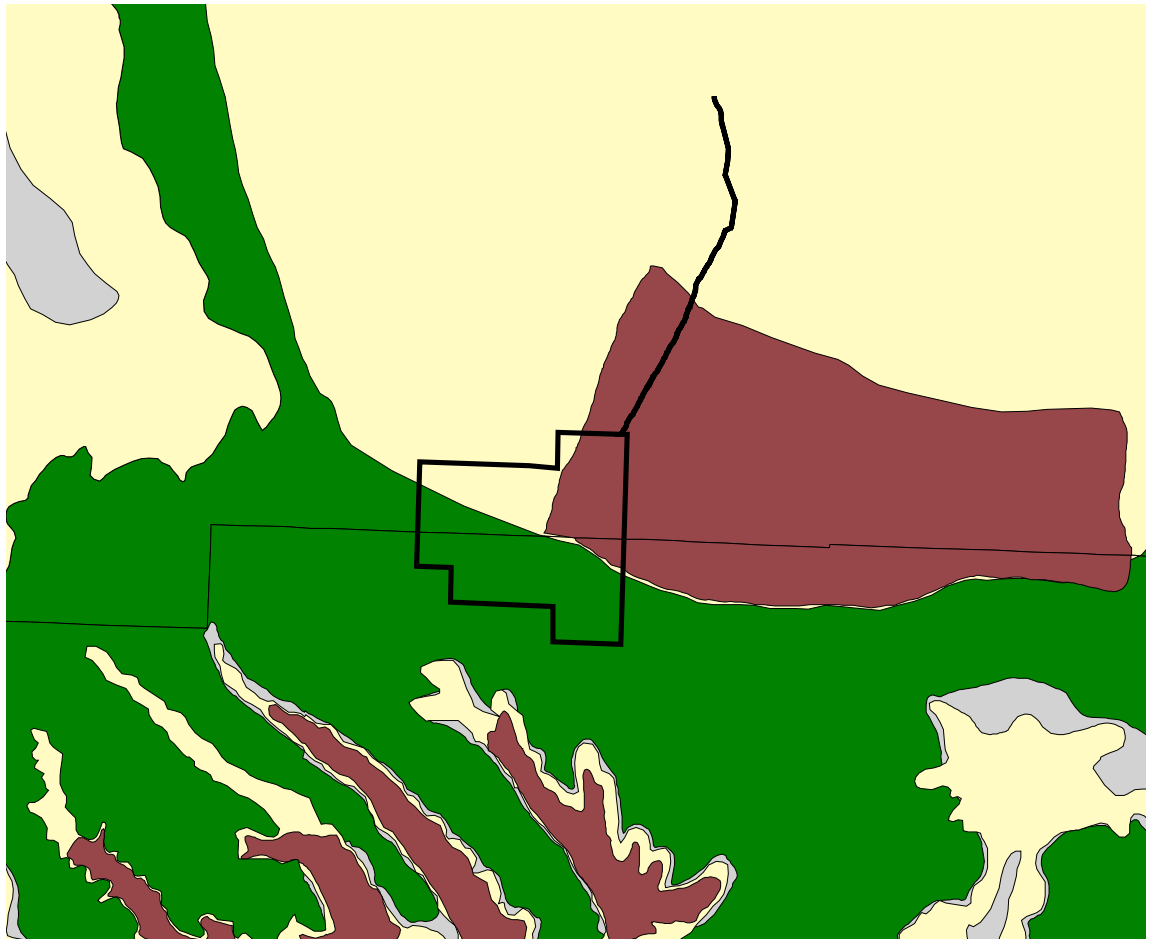

Figure 3-9. Elk Activity Areas

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Buys & Associates

Mule Deer Activity Areas
Figure Four Project Area

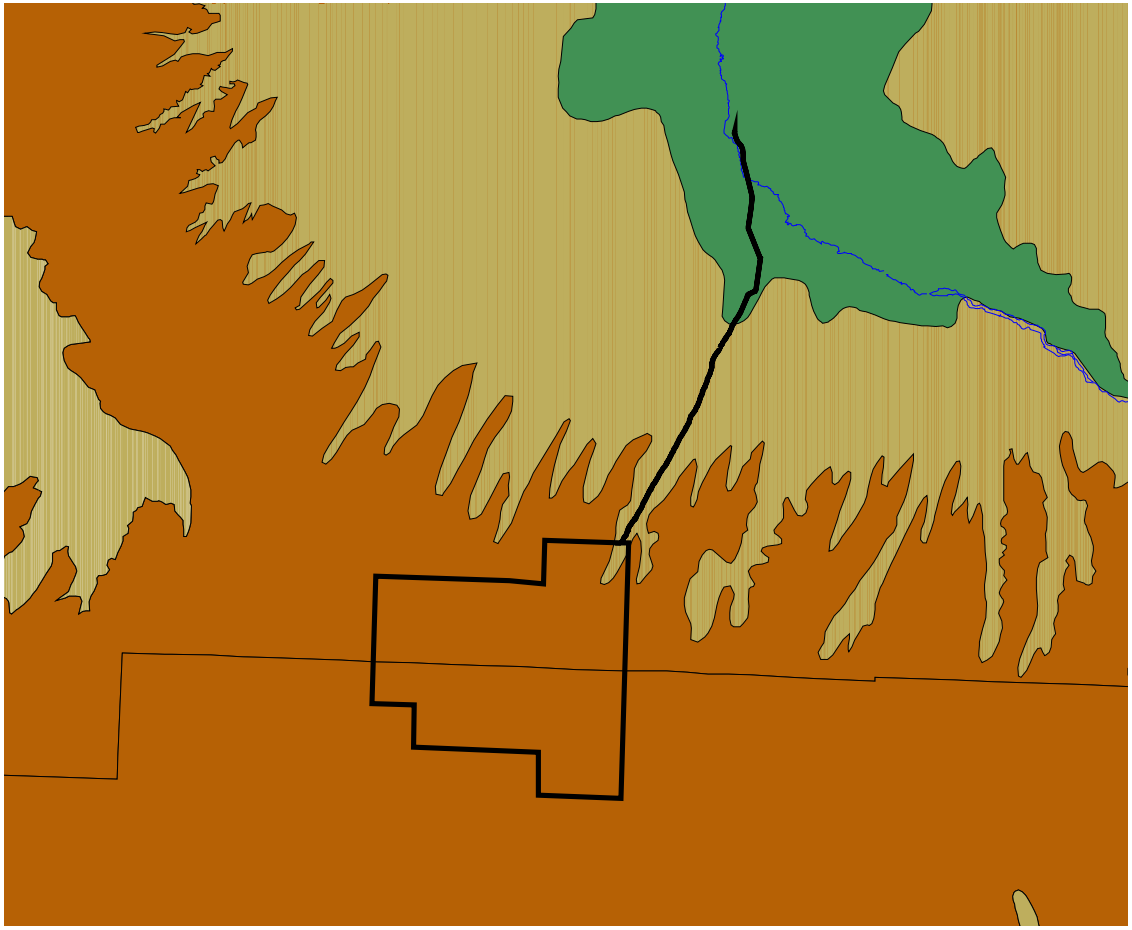

Figure 3-10. Mule Deer Activity Areas

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Bald Eagle Activity Areas
Figure Four Project Area

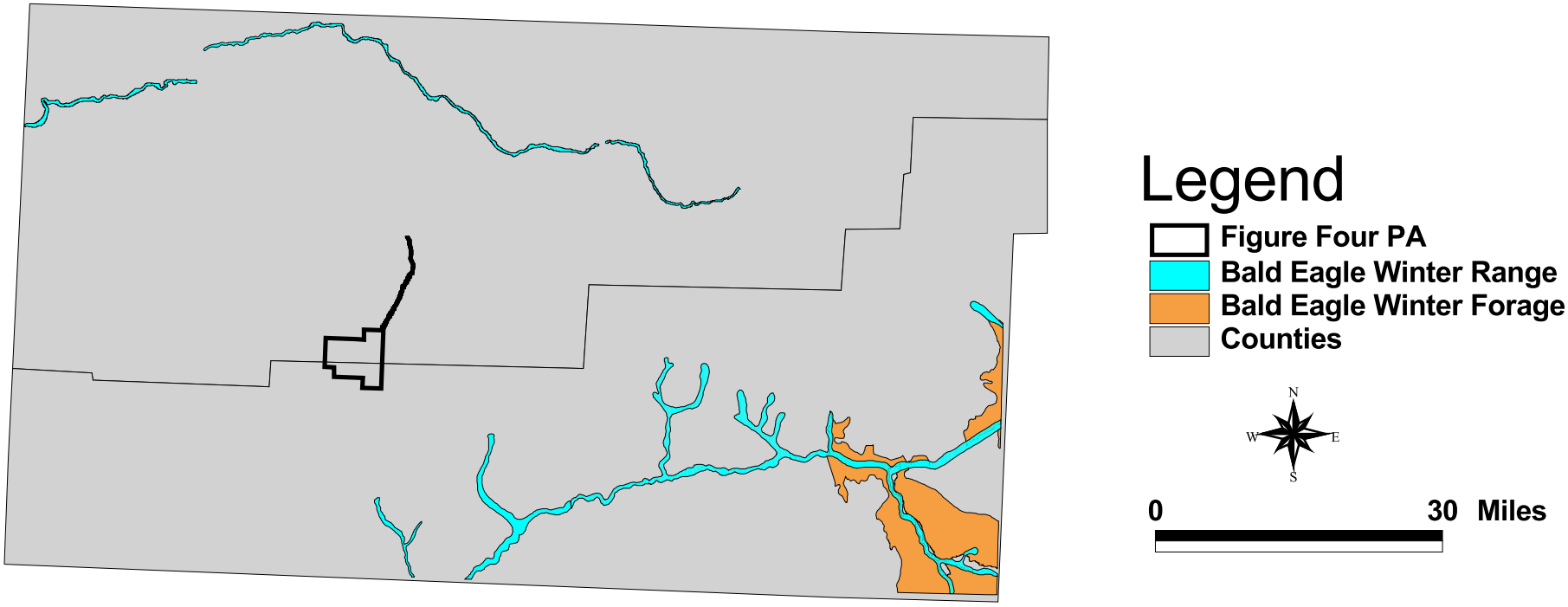

Figure 3-11. Bald Eagle Activity Areas

Prepared By
Buys & Associates

Sage Grouse Activity Areas
Figure Four Project Area

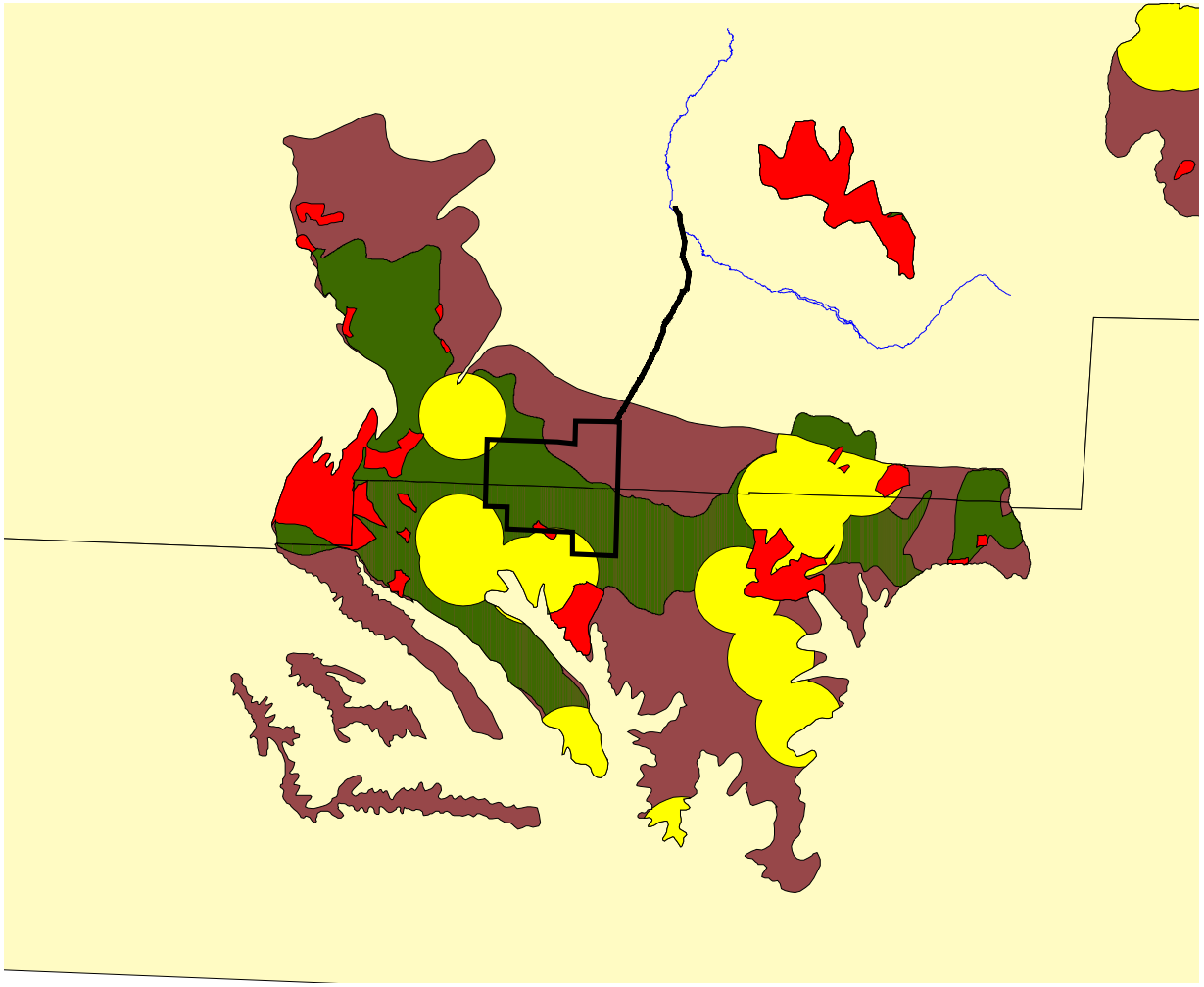

Figure 3-12. Sage Grouse Activity Areas

Prepared By
Buys & Associates

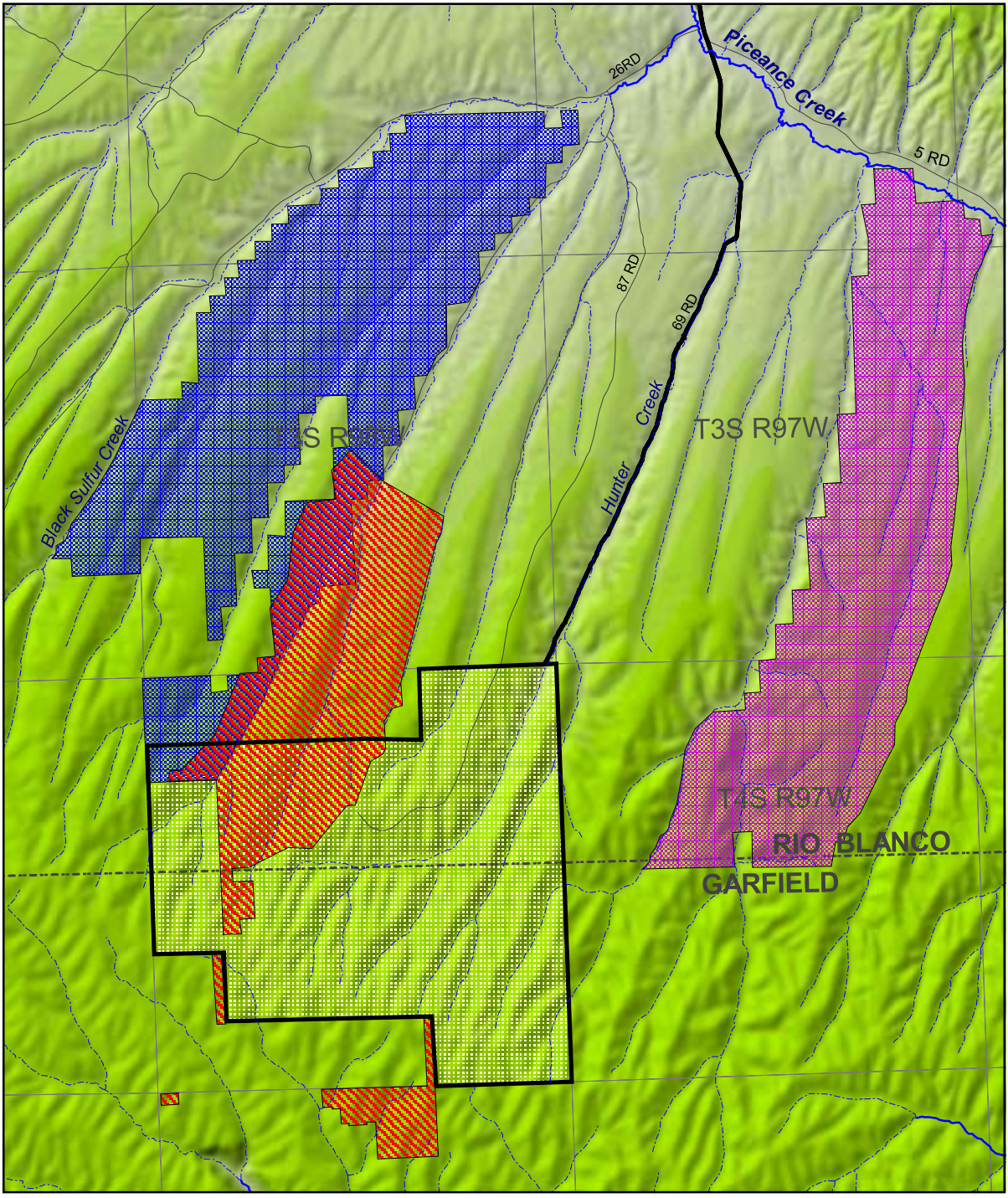

Figure 3-13. Permitted Outfitter Areas within and near the Figure Four Project Area

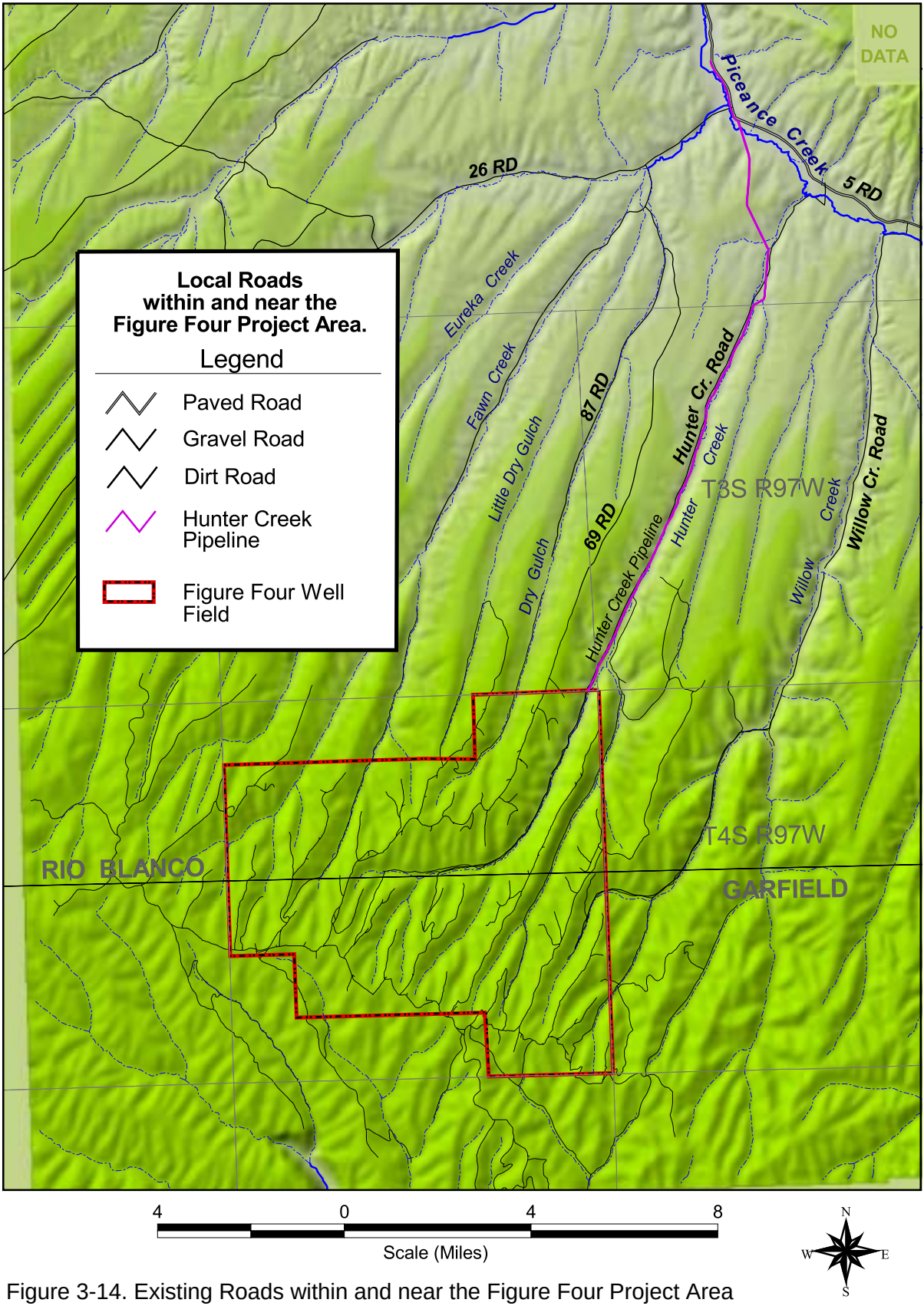

Figure 3-14. Existing Roads within and near the Figure Four Project Area

4.0 ENVIRONMENTAL CONSEQUENCES

This chapter of the Environmental Assessment (EA) provides an analysis of the impacts or environmental consequences that would result from implementation of the Proposed Action or the No Action alternative. The Proposed Action incorporated several project design modifications based on on-site field surveys and also includes several applicant committed Mitigation, as discussed in Chapter 2. The environmental impact analysis documented in this chapter took this modified project design and applicant committed Mitigation into consideration.

An environmental impact or consequence is defined as a modification or change in the existing environment brought about by the action taken. Impacts can be direct or indirect in nature and can be short term or long term. For the purpose of this EA, short-term impacts are defined as those that would occur during the construction phase. Short term impacts effects would occur during the construction of well pads, roads, and pipelines, and during the drilling and completion of natural gas wells. Long term impacts are impacts caused by operation of the well field and would remain for the life of the project or longer.

The impact analysis evaluated the environmental impacts that would occur in the Project Area, regardless of land ownership. However, the Bureau of Land Management's (BLM's) decisions on this project would only apply to federal lands. Mitigation on private lands cannot be required by the BLM. The owner of private lands would specify such measures in their respective surface or right-of-way agreements with EnCana. The impacts reported for development of private minerals on private surface may occur regardless of the BLM's decision. Impacts on non-federal lands are included to provide a full disclosure of effects for the complete project.

4.1 GEOLOGY AND MINERAL RESOURCES

4.1.1 Proposed Action

4.1.1.1 Geology

Potential impacts to geologic resources from the Proposed Action include changes to the local topography and slope stability issues. Well pads along the ridge tops would be excavated into the bedrock of the Uinta Formation and Green River Formation. The well pad excavations would change the local topography to include square- or rectangular-shaped cuts and fills in the ridges in the Project Area. As discussed in Section 4.13, the Project Area is classified as a Class III Visual Resource Management (VRM) area. For Class III Areas, moderate change in the topographic character is expected (BLM 1986).

EnCana has committed to a directional drilling program that would limit the number of well pads constructed to 120. By using directional drilling from fewer pads, the number of locations where topography would be impacted would be reduced. Undercutting of side slopes of canyon walls for well pad construction would occur in some locations as part of the Proposed Action. Undercutting of slopes has the potential to generate slope instability.

Depending on the slopes involved, this instability could lead to slumping of material adjacent to the well pad. The slumps would likely occur following rainstorms or during snowmelt. However, well pad construction would be designed to minimize the potential for slumping.

4.1.1.2 Mineral Resources

Natural Gas

Potential impacts to natural gas resources include the depletion of the resources due to active extraction by the Proposed Action from 327 wells. However, since the Proposed Action would not result in complete development of the Figure Four Unit, some economic gas resources would remain in place. The expected life of the project is approximately 20 to 30 years.

Oil Shale

Potential impacts to oil shale resources include the removal of small amounts of the resource from potential mining operations over the life of the Proposed Action. The richest oil shale zone is the Mahogany Zone, within the Parachute Member of the Green River Formation. This zone occurs at a depth of approximately 200 to 1,000 feet beneath the Project Area. The target zones for the gas production are within the Williams Fork Formation, approximately 6,000 feet below ground surface. Therefore, no direct impacts to the oil-shale resource are expected within the Project Area. However, the construction of surface facilities for the project may preclude the mining of oil shale from portions of the Project Area over the life of the Proposed Action.

As part of the Standard Operating Procedures for the project development, all zones of oil shale would be protected using casing, cementing, or other isolation methods. The Conditions of Approval described in Appendix B of the White River ROD/RMP (BLM 1997a) would be followed to protect oil shale resources.

4.1.1.3 Salable Minerals

Potential impacts to salable mineral resources include the depletion of sand and gravel deposits due to construction activities for the proposed project. These salable minerals would be purchased from private sources outside the Project Area.

4.1.2 No Action Alternative

4.1.2.1 Geology

Under the No Action alternative, the Proposed Action would not be implemented. Only privately-owned natural gas resources would be developed on privately-owned lands (i.e., no federally-owned natural gas would be developed apart from those previously permitted). Approximately 6 well pads would be constructed under the No Action alternative. Changes to the local topography in the Project Area would occur only at these locations.

4.1.2.2 Mineral Resources

Natural Gas

Under the No Action alternative, the Proposed Action would not be implemented. Only privately-owned natural gas resources and previously permitted federal wells would be developed. Figure 4-1 shows the locations of the existing gas wells within the Project Area. Approximately 6 new well pads would also be constructed on private lands under the No Action alternative. Due to the smaller number of wells, natural gas extraction would occur at a much lower rate (approximately 95 percent slower), and the majority of the gas resources in the Project Area would remain available for future extraction.

Oil Shale

Under the No Action alternative, the Proposed Action would not be implemented. Only privately-owned natural gas resources and previously permitted federal wells would be developed. Approximately 6 well pads would be constructed on private lands under the No Action alternative. Therefore, the vast majority of the Project Area would remain available for potential future extraction of oil shale resources.

4.1.2.3 Salable Minerals

Under the No Action alternative, the Proposed Action would not be implemented. Only privately-owned natural gas resources and previously permitted federal wells would be developed. Approximately 6 well pads would be constructed under the No Action alternative. Therefore, approximately 95% less sand and gravel would be required for Project construction.

4.1.2 Mitigation

4.1.3.1 Geology

On slopes greater than 35%, Controlled Surface Use Stipulation CSU-1 would apply. CSU-1 states that a construction/reclamation plan must be submitted for these areas and include methods to restore soil productivity and manage surface water runoff. No additional Mitigation are proposed for geology because the Proposed Action and applicable surface stipulations would minimize the potential for topographic and slope failure impacts.

4.1.3.2 Mineral Resources

Natural Gas

No mitigation is required because the purpose of the project is to extract oil and gas resources.

Oil Shale

No mitigation is required for protection of oil shale resources.

4.1.3.3 Salable Minerals

There are no mitigation measures required to protect salable mineral resources.

4.2 PALEONTOLOGY

4.2.1 Proposed Action

Potential impacts to paleontological resources include the loss of scientifically important fossils due to ground-disturbing activities such as well pad, reserve/blooie pits, road, and pipeline excavation and grading. Alternatively, construction of well pads, access roads, and pipeline corridors may uncover scientifically important fossils. Lease Notice LN-2 of the White River Field Office area Resource Management Plan (BLM 1994) designates the Uinta and Green River Formations as Class I paleontological areas that have the potential to contain important fossils. Under the Proposed Action, the stipulations contained in Lease Notice LN-2 would be observed. Prior to ground-disturbing activities, on-site paleontological surveys would be conducted in areas with exposed bedrock or shallow soils. Care would be taken during construction activities to observe the bedrock and soils for signs of fossils. If significant fossils resources are encountered, construction activities would be halted and the BLM notified of the occurrence immediately. An EnCana paleontologist would then visit the site and make site-specific recommendations for impact avoidance. Operations in the area of the discovery would not resume until written authorization to proceed has been received from the BLM Authorized Officer. The BLM may, at its discretion, also require that a monitor be present during construction activities to look for significant fossils.

4.2.2 No Action Alternative

Under the No Action alternative, the Proposed Action would not be allowed. Construction for new natural gas wells would likely be limited to six well pads constructed on private lands and previously permitted federal wells. Therefore, significant loss (or gain) of fossils resources in the Project Area would likely not occur.

4.2.3 Mitigation

Since Lease Notice LN-2 would be complied with and surveys would identify any exposed paleontological resources, and since discovered resources would be recovered or recorded as required, no additional Mitigation are proposed.

4.3 SOILS

4.3.1 Proposed Action

Potential impacts to soils from construction of the Proposed Action would include changes in physical, chemical, and biological properties. Impacts to fragile soils, especially accelerated erosion and loss of soil productivity to the extent that revegetation and reclamation success could be impaired, are the key issues for analysis of impacts to the soils resource.

Potential impacts to soils in the Project Area from the Proposed Action include removal of vegetation, mixing of soil horizons, soil compaction, increased susceptibility of the soils to wind and water erosion, contamination of soils with petroleum products, and loss of topsoil productivity. A total of 901.2 acres of soils would be disturbed for well pads, road construction, pipeline routes, and other project facilities during the short-term. This represents about 5.2 percent of the land surface in the Project Area. The total acreage disturbed for the long-term would be about 480.0 acres (2.8 percent of the Project Area). As part of the Proposed Action, topsoil would be conserved. Topsoil excavated from well pad locations would be scalped, stockpiled, and seeded to preserve it for future reclamation of the well pads at the end of the project life.

Many of the soil types in the Project Area are classified as fragile due to elevated erosion potential. Most of the proposed well pads are located partially or entirely on these fragile soils. Table 4-1 provides a breakdown of the soil types, the number of pads proposed for each soil type, and the acreages of disturbance for each soil type. Approximately 486.65 acres out of the 510.0 acres estimated for well pad construction are on soils considered to be fragile. The most disturbance would be to soils of the Irigul-Parachute complex (174.25 acres), Parachute-Irigul –Rhone complex (87.13 acres), the Starman-Vandamore complex (68.0 acres), the Irigul-Starman channery loam (46.75 acres), and the Parachute loam (40.38 acres). Each of these soil types has a water erosion hazard that is moderate to very severe. Excavation of well pads could potentially result in increased erosion of these soils in the short-term. The increased erosion of soils could potentially lead to increased sedimentation in watercourses, siltation of ponds, and loss of vegetative cover on the side slopes of the ridges. Accelerated erosion will likely continue over the life of the project, but would be reduced with the implementation of the Mitigation identified in Section 4.3.3.

Table 4-1. Soil Units, Numbers of Well Pads on Each, and Acreages of Disturbance

Soil Map Unit Number[1]	Soil Unit Name[2]	Fragile Soil ?	Number of Well Pads[3]	Acreage of Disturbance
Rio Blanco County				
15	Castner channery loam	Yes	1	4.25
43	Irigul-Parachute complex	Yes	25	85.0
56	Northwater loam	Yes	1	2.13
58	Parachute loam	Yes	15	40.38
76	Rhone loam	Yes	5	17.0
87	Starman-Vandamore complex	Yes	22	68.0
91	Torriorthents-rock outcrop complex	Variable	7	14.88
96	Veatch channery loam	No	8	23.38
Garfield County				
50	Irigul-Starman channery loam	Yes	13	46.75
52	Northwater-Adel complex	Yes	6	17.0
55	Parachute-Irigul complex	Yes	24	89.25
56	Parachute-Irigul-Rhone complex	Yes	28	87.13
57	Parachute-Rhone loam	Yes	1	2.13
66	Torrifluvents-warm-Rock complex	Yes	3	12.75
67	Tosca channery loam	Yes	1	2.13
		TOTAL		510.03

[1]See Figure 3-3 for soils map
[2]See Table 3-1 for descriptions of soil units
[3]Portions or entire well pad located on the soil unit

Construction of access roads would also increase the amount of erosion occurring in the Project Area. A total of 330.9 acres of new access roads are proposed. These roads would cross the same soil units as described above for the well pads. Sedimentation of water courses adjacent to these roads could potentially increase from the road surfaces for the long-term. The use of Best Management Practices during road construction and operation would reduce the level of potential impacts to the Project Area streams.

Contamination of surface and subsurface soils near oil and gas facilities can occur in oil and gas fields. Sources of potential contamination include leaks from wellheads, conveyance pipelines, compressor stations, produced water sumps, and condensate storage tanks. Petroleum released to surface soils infiltrates the soil and can migrate vertically until the water table is encountered.

4.3.2 No Action Alternative

Under the No Action alternative, the Proposed Action would not be implemented. Natural gas resources would only be developed on privately-owned lands and previously permitted federal wells. Approximately 6 well pads would be constructed under the No Action alternative. The estimated surface disturbance for the No Action alternative is 58.2 acres for the short-term and 31.7 acres for the long-term.

4.3.3 Mitigation

Surface stipulations described in Appendix A of the White River ROD/RMP (BLM 1997a) would apply to the Proposed Action and would reduce the potential for erosion-related impacts, if implemented properly. Specifically, the following surface stipulations are applicable:

- NSO-1 (Landslide Areas)
- CSU-1 (Fragile soils on slopes > 35%)
- CSU-4 (Aspen, Serviceberry, and Chokecherry Communities)
- CSU-5 (Bald Eagle Nest, Roost, and Perch Habitat)

In addition to surface stipulations, the application of Conditions of Approval (COAs) during the excavation of well pads, roads, and other project facilities, the minimization of surface disturbances, salvaging and stockpiling of topsoils, and revegetation would reduce the potential for soils impacts. The COAs are described in Appendix B of the White River ROD/RMP (BLM 1997a), and include, but are not limited to, the following measures:

- COA B-4 (stripping and stockpiling of topsoils)
- COA B-5 (sedimentation catchment basins)
- COA B-6 (sediment control structure required volumes)
- COA B-8 (no activities during times of saturation of road surfaces)
- COA B-9 (no mud blading of roads)
- COA B-16 (avoidance of headwalls, unstable slopes, etc.)
- COA B-19-27 (road construction practices)

Additional Best Management Practices (BMPs) that would be employed during construction of project facilities include, but are not limited to, the following:

- Silt fences
- Water bars on roadways
- Covering sensitive areas with geotextiles during revegatation
- Sediment traps
- Berms

To reduce the potential for hydrocarbon contamination of soils, pipelines, compressor stations, and associated collection piping would be designed to minimize the potential for spills and leaks. Storage tanks would be surrounded by berms capable of holding at least 110% of the tank volume.

Mitigation of the potential for petroleum contamination of soils would include regular inspection of project facilities for the presence of leaks or spills. If soil contamination is discovered, the Colorado Oil and Gas Conservation Commission (COGCC) would be notified immediately and remediation of the contamination conducted. For soils, this remediation could consist of excavation of the impacted soils, transport of the contaminated

soils to a facility licensed to accept petroleum-contaminated soils, and backfilling of the excavation with clean fill.

4.4 SURFACE WATER

4.4.1 Proposed Action

Potential impacts to surface water resources from the Proposed Action include increased turbidity and sedimentation in watercourses, increased short-term runoff, increased salt-loading, contamination of surface water courses and ponds by produced water and petroleum, and depletion of surface water flows in Piceance Creek and possibly the White River. Impacts would likely be greatest shortly after the start of construction activities and would likely decrease in time due to natural stabilization, reclamation, and revegetation efforts. Surface water quantity could also be affected by the water use requirements of the project.

The magnitude of these impacts to surface water resources would depend on several factors, including the proximity of the disturbance to drainages or ponds, slope aspect and gradient, soil type, duration and timing of the construction activity, and the success or failure of Mitigation. Any increase in quantity of stream flow due to these disturbances would be negligible due to the relatively small area affected at any given time and the general lack of perennial streams across most of the Project Area.

Increased short-term sedimentation of surface water could potentially occur during the construction of well pads, access roads, and pipelines for the Proposed Action due to increased erosion during snowmelt and precipitation events. Increased turbidity could affect aquatic organisms that live in various streams in the Project Area, including Piceance Creek. The impact from increased sedimentation would be negligible since most of the drainages in the Project Area are ephemeral. Increased sedimentation of Piceance Creek may occur in the short-term due to the construction of the proposed pipeline crossing. Increased salt-loading could potentially occur where saline soils would be disturbed and eroded by runoff into streams. Generally, impacts from increased sedimentation, turbidity, and salinity are largest during construction of project facilities and decrease to negligible levels within three years (BLM 1998).

Soil compacted on roadways and well pads contribute greater runoff than undisturbed sites. The increased runoff could lead to slightly higher peak flows in Piceance Creek, potentially increasing erosion of the channel banks.

Contamination of surface water near oil and gas facilities can occur in oil and gas fields. Sources of potential contamination include leaks from wellheads, conveyance pipelines, compressor stations, produced water sumps and condensate storage tanks, leaks from tanker trucks, and leaching of contaminants from impacted soils near these facilities. To reduce the potential for hydrocarbon contamination of surface water, pipelines, compressor stations, and associated collection piping would be designed to minimize the potential for spills and leaks. Storage tanks would be surrounded by berms capable of holding at least 110% of the tank volume.

Water would be used by the project during construction activities for drilling, dust control, and hydrostatic testing of the pipelines. The Proposed Action would use a maximum of 125 acre-feet per year for these activities. The annual average discharge of Piceance Creek at the White River is 39 cubic feet per second (cfs), or about 28,242 acre-feet per year. Therefore, the maximum water depletion from the Proposed Action for Piceance Creek is about 0.44% of the current flow. For the White River, the average annual discharge below Boise Creek is about 789 cfs (571,362 acre-feet). Accordingly, the maximum water depletion in the White River is about 0.022% of the current flow.

4.4.2 No Action Alternative

Under the No Action alternative, the Proposed Action would not be implemented. Natural gas resources would only be developed on privately-owned lands and previously permitted federal wells. Approximately 6 well pads would be constructed under the No Action alternative, with a corresponding decrease in the amount of short-term impacts to surface water resources.

4.4.3 Mitigation

Protection of surface water resources would be accomplished by using the Conditions of Approval (COAs) cited in Appendix B of the White River ROD/RMP (BLM 1997a). The appendix lists COAs for construction of roads, tanks and pits, oil and gas wells, and pipelines that apply to surface water resources including, but not limited to, the following:

- Sedimentation control structures
- Stockpiling of topsoils
- Locating roads, pipelines, and other facilities away from watercourses, where possible
- Sloping, crowning, and ditching of roads
- Requirements for culvert construction
- Requirements for tank and pit construction and reclamation
- Well drilling, plugging, and completion requirements
- Requirements for pipeline construction
- Revegetation of access road and well pad cut- and fill-slopes

Additional Mitigation, above and beyond the COAs described for the Proposed Action, would include regular inspection of well pads, including topsoil stockpiles, cut- and fill-slopes, roads, and pipeline corridors for signs of erosion and runoff problems. Problem locations would be stabilized and seeded as appropriate to prevent additional erosion and potential impacts to receiving waters, and regular inspection of sediment control structures, drainage structures, and culverts for signs of failure or malfunction and repair of those facilities.

4.5 GROUNDWATER

4.5.1 Proposed Action

Potential impacts to groundwater resources from the Proposed Action include contamination of groundwater with produced water, drilling mud, or petroleum. Alluvial aquifers along the tributaries to Piceance Creek could potentially be contaminated by releases of petroleum from compressor stations, wellheads, and conveyance pipelines. Soil contamination near these facilities, if not remediated quickly, could migrate into the underlying alluvial groundwater and dissolve benzene and other constituents into the groundwater. However, alluvial groundwater in these drainages is currently not used for domestic purposes. Limited use of alluvial groundwater for domestic use and stock watering is the only present use for the alluvial groundwater.

The Upper and Lower Aquifers are located within the Parachute Creek Member of the Green River Formation beneath the Project Area. There is a minor potential for commingling of waters from the Upper and Lower aquifers during well construction, if proper well drilling procedures and completion techniques are not employed.

4.5.2 No Action Alternative

Under the No Action alternative, the Proposed Action would not be implemented. Natural gas resources would only be developed on privately-owned lands and previously permitted federal wells. Approximately 6 well pads would be constructed under the No Action alternative, with a corresponding decrease in the amount of potential impacts to alluvial groundwater resources from spills and leaks of petroleum.

4.5.3 Mitigation

Impacts to these groundwater aquifers are not expected, providing that the Conditions of Approval (COAs) referenced in Appendix B of the White River ROD/RMP (BLM 1997a) are adhered to. These COAs include locating roads, pipelines, and other facilities away from watercourses, where possible; requirements for tank and pit construction and reclamation; and well drilling, plugging, and completion requirements.

In addition to the COAs mentioned above, impacts to groundwater aquifers would be mitigated through regular inspection of project facilities containing hydrocarbons, such as tanks, wellheads, and above-ground piping to identify any potential leaks.

4.6 AIR QUALITY

4.6.1 Proposed Action

Project-related air pollutant emissions have the potential to affect air quality on both a local and a regional scale. Emission inventories were developed and dispersion modeling was performed to assess the potential air quality impacts from the Proposed Action with respect to various significance criteria. The modeling assessment of the Figure Four Project consists

of evaluating air quality impacts on sub-grid, near-field, and far-field scales. The Industrial Source Complex (ISC) dispersion model was used to evaluate the sub-grid and near-field impacts. The CALMET/CALPUFF dispersion model was used to evaluate far-field impacts.

The sub-grid analysis modeled air quality impacts from short-term activities such as well pad and road construction, well drilling, and well completion activities that would not only be geographically separated, but would not generally occur simultaneously. A construction scenario was developed for each short-term activity. The sub-grid modeling also assessed impacts from hazardous air pollutants (HAP).

The mid-range analysis involved the impacts within the Project Area, and to a distance of 10 kilometers beyond the project boundary, that would occur from permanent facilities installed for the 30 year life of the project. This analysis included all well pad, compressor station, and vehicle-related emissions that would occur after the field would be fully developed.

The far-field analysis evaluated potential air quality impacts as well as air quality related values (visibility and acid deposition) at distant federal Class I and selected Class II areas. Far-field modeling was performed to assess both construction and operational impacts.

This section summarizes the air quality impacts of the Figure Four Proposed Action. The complete description of emissions, processes, modeling methodology, and results is found in Appendix D.

4.6.1.1 Emissions

Emission inventories were developed for the Proposed Action and the No Action alternative. The annual emissions during both peak-year construction activities and average long-term operations are described in detail in Appendix E. Project emissions would be emitted from the following activities and sources:

- Well pad and road construction: equipment producing fugitive dust while moving and leveling earth;
- Drilling: vehicles generating fugitive dust on access roads, and drill rig engine exhaust;
- Completion: vehicles generating fugitive dust on access roads and flaring emissions;
- Vehicle and equipment exhaust emissions associated with all development phases;
- Well pad operation: three-phase separators, flashing and breathing emissions from condensate tanks; and
- Compressor stations: compressor engines and central glycol dehydration units.

4.6.1.2 Near-Field Impacts

Impacts from the project activities were evaluated using the ISC pollutant dispersion model near Figure Four and the CALPUFF dispersion model at Class I and Class II areas distant from Figure Four. The results indicated that the Proposed Action would be incompliance with all applicable air quality standards. PM_{10} impacts during construction activities would result in maximum ambient air concentrations 83 percent of applicable standard. This level would occur at the edge of well pad and/or road construction.

During operation of the Proposed Action after all construction would be complete, the highest predicted ambient air concentrations of PM_{10}, NO_2, and CO near project activities is predicted to be 23 percent, 52 percent, and 50 percent, respectively, of the applicable ambient air standards. These maximum levels would all occur within the Figure Four boundary. Therefore, it can be concluded that the Proposed Action would not contribute to any near-field exceedances of applicable air quality standards.

4.6.1.3 Far-Field Impacts

Effects on air quality, visibility, acid deposition, and acid neutralizing capacity at high elevation lakes were evaluated at distant Class I and Class II areas using the CALPUFF model. All parameters are predicted to be well below all applicable standards

Ambient air concentrations were predicted to be less than one percent of applicable Class I and Class II increments. Acid deposition at the Class I and Class II areas is predicted to be less than 0.1 percent of significant threshold values for acid deposition. The potential change in acid neutralizing capacity in high elevation lakes is predicted to be less than 0.1 percent. A 10 percent change is considered significant. Finally, the maximum decreases of visibility would be .34 deciview, a value one-third of the "just noticeable change" of 1.0 deciview. Therefore, similar to the near-field analysis, it can be concluded that the Figure Four Proposed Action would not cause any exceedances of applicable air quality standards at far-field Class I or Class II areas.

4.6.2 No Action Alternative

Under the No Action Alternative, natural gas resources in and around the Figure Four Unit would only developed on privately-owned minerals leased by the proponent and previously permitted federal wells. Under the No Action alternative, approximately 6 well pads (compared to 120 under the Proposed Action) with approximately 18 gas wells (compared to 327 under the Proposed Action) would be constructed on fee surface to develop fee minerals. The gas would be transported outside the Figure Four Unit by a smaller pipeline that would serve existing fee wells in the area. Additional compression would not be required.

Project-related pollutants during the construction phase would be 96 percent lower than those assumed for the Proposed Action because of the lower number of potential pads to be constructed and wells to be drilled. Because new compression would not be required, project-related emissions would be reduced more than 95 percent. Since the analysis has demonstrated that no significant air quality impacts would occur from implementation of the Proposed Action, the minor emissions associated with the No Action alternative would be insignificant.

4.6.3 Mitigation

Mitigation of air quality impacts would be accomplished through the permitting of all regulated air pollution sources through the Colorado Department of Public Health and Environment, Air Pollution Control Division. The construction and operating permitting processes, where applicable (compressor engines, large glycol dehydration units), typically

require the use of clean burning engines and emissions controls to reduce air pollution emissions and impacts to air quality. For smaller, minor sources of air pollution (small dehydrators, condensate tanks), impacts are generally insignificant and mitigation is not warranted.

To reduce the emission of fugitive dust from access roads in the Project Area, routine road watering and/or application of magnesium chloride would be carried out when the roads are dry.

4.7 NOISE

4.7.1 Proposed Action

4.7.1.1 Construction Noise

Noise above existing levels would occur during the construction of the proposed project. Construction noise levels would be moderate but short-term (10 to 30 days) at any given location. Based on an average construction site noise level of 85 dBA at 50 feet from the site, the construction noise could be above 55 dBA within 1,500 feet of the site. Additionally, elevated noise levels would occur along access roads as vehicles and heavy equipment would travel to each site. However, elevated noise levels would occur for a period of a week at any given location and would occur only during daytime because construction would not generally occur between sunset and sunrise.

Noise impacts from drilling and completion activities would be moderate and would last approximately 50 days at any one location. Based on a measured noise level of 50 dBA at ¼ mile (1,320 feet) from a drill rig, the noise would be above 55 dBA within 800 feet of a drill rig. However, drilling noise would occur continuously for 24 hours per day during the 30 day drilling period.

Additionally, noise levels would be elevated along access roads during the construction sequences. However, the majority of traffic would occur during the morning and evening hours as workers arrive at and leave from the construction and drilling sites. Vehicle traffic would be negligible during evening hours.

It is important to note that there are no residences within the proposed well field area. The nearest residence is located near the bottom of Hunter Creek Valley, approximately 7 miles to the north of the well field. This residence would be primarily impacted by noise associated with daytime access road traffic and possibly construction of the lower compressor station and main gathering pipeline, which would be located about 1 mile to the south. Impacts to wildlife associated with construction noise emissions are described in Section 4.9.

4.7.1.2 Operational Noise

After construction activities, noise increases from natural gas extraction activities would occur for the life of the project near production facilities such as compressor stations, well

pads, and along access roads. The primary source of operational noise would be the proposed compressor stations. Noise impacts would be major near compressor stations and minor along access roads due to infrequent operations traffic. Additional noise sources would include periodic maintenance and workovers at well sites.

Noise has been measured at typical compressor units (USGS 1981). A noise level of 90 dBA from one large compressor engine can be expected at 10 feet from a compressor engine. A compressor building enclosing compressor engines would afford further noise attenuation of about 15 dBA. Therefore, Figure Four compressor engines would be expected to generate approximately 75 dBA at 10 feet because compressor engines would be enclosed in buildings to afford protection from winter weather.

The proposed compressor stations would have four engines at one location and two engines at the other. The effect of multiple noise sources is not arithmetically additive, but rather is a logarithmic summation. The total effect of multiple collocated noise sources is characterized by the following relationship (Harris 1991):

$L = 10 * LOG (10L_1/10 + 10L_2/10 + ... + 10L_n/10)$
where: L_1, L_2, ..., L_n are the source sound levels of individual collocated sources.
L is the overall noise level.
LOG is the common logarithm base 10.

The preceding equation was used to estimate the overall source noise from the Figure Four compressor stations. Table 4-20 below shows the predicted noise levels near the Figure Four compressor stations at 100-foot increments out to 2,000 feet. As shown in Table 4-20, noise levels are predicted to decrease below 50 dBA, the night-time COGCC noise limit, at 340 feet from the 4-engine compressor station and 260 feet from a 2-engine compressor station.

Table 4-20. Predicted Noise Near Figure Four Compressor Stations.

Distance (feet)	Predicted Noise (dBA) 4 compressor engines	Predicted Noise (dBA) 2 compressor engines
100	61.0	58.0
200	55.0	52.0
300	51.5	48.5
400	49.0	46.0
500	47.0	44.0
600	45.5	42.4
700	44.1	41.1
800	43.0	39.9
900	41.9	38.9
1000	41.0	38.0

Based upon the published and regulatory noise level effects, the health and welfare of the general population would not be at risk from any of the identified effects of noise at that level beyond 200 feet from the largest proposed compressor station. No residences are near the proposed compressor stations and it is highly unlikely that a residence would be built this close because of the topography and the very limited private land. The one residence located

about one mile to the north of the lower compressor station site would experience minimal noise impact from operation of that compressor station.

4.7.2 No Action Alternative

Apart from previously permitted wells in the Project Area, only 18 gas wells would be developed on private gas leases only under the No Action alternative. Although levels would be comparable, noise impacts would affect a smaller number of locations during construction, drilling, and completion for a shorter period of time. Since no additional compression is envisioned as part of this alternative, operational noise would be limited to infrequent vehicle trips on access roads serving the well locations.

4.7.3 Mitigation

If a compressor station would have to be located closer than 400 feet to an existing residence or other sensitive receptor, it would be sited to take advantage of naturally-occurring obstacles or would be constructed with man-made obstacles in the direct path between the noise source and the receiver. These natural or man-made obstacles must be high enough to break the line-of-sight between the compressor station and the residence/noise receptor. Man-made obstacles can be tightly spaced wood fences (no gaps in the wood panels), concrete fences, or earth berms.

4.8 VEGETATION AND RANGELAND RESOURCES

4.8.1 Proposed Action

4.8.1.1 General Vegetation Impacts

Impacts from construction of project facilities would include the disturbance or removal of vegetation. Key issues for analysis of impacts to vegetation include:

- The total amount of incremental disturbance of an array of plant communities; and
- Adequacy of the proposed reclamation plan to meet post-construction land use objectives, primarily wildlife habitat.

Additional impacts of concern include disturbance of special status plant species, loss of wetland and riparian habitat, control of noxious weeds, and loss of grazing opportunities.

Disturbance may be short-term, for example from use of temporary construction work zones and pipeline installation, or long-term, where project facilities such as well pads, roads, and compressor stations would occupy previously vegetated areas for approximately 30 years. Areas of short term disturbance would be reclaimed as soon as possible after construction activities (around 2007), while areas of vegetation occupied by semi-permanent project facilities would be reclaimed at the conclusion of the project (around 2043). The success or failure of revegetation would affect other resources including soils, surface water, wildlife, visual resources and livestock grazing. Although ground disturbance would be short-term in

many locations, such as along pipeline corridors, the ecological effects could be long-term, depending on the plant community affected and the rate and success of revegetation.

The relative degree of impacts to different vegetation communities depends on their social and ecological sensitivity and importance:

- Pinyon-juniper woodlands in the study areas provide severe winter range habitat for big game, especially mule deer. They also provide nesting habitat for various raptors and other species. Depending on the level of disturbance, it would take about 30 to 50 years before trees in revegetated areas would be mature enough to provide adequate thermal cover for big game and favorable nesting opportunities for raptors.
- Sagebrush and mountain shrub communities could have a recovery time from 20-50 years after the proposed disturbance activities. Impacts to these communities in severe winter range could adversely affect big game forage and cover habitat for the short- to mid-term and reduce the carrying capacity of critical habitat during the period required to re-establish vegetation. In addition, mountain and Wyoming sagebrush provides habitat for the greater sage grouse, particularly on flat ridgetop settings.
- Wetland and Riparian areas are considered sensitive because of their importance for wildlife habitat, biotic diversity, and their role in water quality protection. Wetlands and riparian areas are discussed in more detail in Section 4.8.1.5.
- The loss or disturbance of identified special status plant communities and/or habitat at well pads, associated pipelines, and access roads would be considered an adverse impact.
- Invasion of noxious weeds that impairs vegetation efforts or affects lands outside the Project Area, due to a lack of weed management, would be an adverse impact.

Direct impacts include the loss or removal of vegetation due to construction of support facilities, roads, and well field development. Pinyon-juniper woodlands and sagebrush steppe communities are the dominant vegetation communities within the Figure Four Project Area, although, sagebrush steppe and mountain shrub are those communities that would be primarily affected by the proposed Figure Four Unit Project. Within the well field and along the Hunter Creek pipeline corridor, all vegetation would be removed where these project facilities would be installed.

Direct impacts under the Proposed Action from development of the Figure Four Unit and associated pipelines would include the incremental disturbance or loss of approximately 901.2 acres of vegetation over the 30-year life of the project. Direct disturbance from well pads, pipelines, and roads by ecological range site are provided in Table 4-21. The table identifies the number of acres disturbed in each ecological range site during initial construction and the residual acreages affected for the 30-year life of the project. Figure 4-2 provides a map showing the distribution of ecological range sites across the Project Area

Indirect impacts would include loss of vegetation due to trampling and soil compaction, accidental spills of fuels, lubricants, and fugitive dust. Other potential indirect impacts include the introduction of noxious weeds in disturbed areas that would compete with desired

species and invade contiguous native plant communities. In addition, fragmentation of plant communities and their associates would be likely to occur.

Table 4-21. Disturbance Acres of Each Ecological Site as a Result of Project Implementation

Ecological Site	Initial Disturbance (Acres)	Residual Disturbance After Reclamation (Acres)
Aspen Woodlands	41.7	20.7
Brushy Loam	285.3	156.4
Dry Exposure/Dry Exposure	190.1	106.8
Foothills Swale	16.1	8.1
Loamy Slopes/Mountain Loam	250.0	141.8
Mountain Swale	16.1	13.4
Mountain Pinyon	0.0	0.0
Pinyon-Juniper Woodlands	9.6	4.9
Stoney Foothills	23.4	10.5

4.8.1.2 Special Status Plant Species

The Proposed Action would have no direct effects on special status plants within the Figure Four Unit. Assuming EnCana implements the policies/practices to comply with the surface disturbing stipulations and COAs established by the BLM, no construction would take place within areas containing known populations of special status plant species. All potential habitats would be surveyed prior to construction activities and all special status plant species would be inventoried and avoided. As a result, there would be no effect on the achievement of Public health Standard 4, which addresses special status plant species.

Increased use of Off Highway Vehicles (OHVs) within the Project Area from the presence of new access roads could result in indirect effects to special status plant species.

4.8.1.3 Noxious Weeds

Disturbed areas and recently revegetated areas are susceptible to invasion by undesired plant species such as leafy spurge, spotted knapweed, Russian knapweed, Canada thistle, houndstongue, yellow toadflax and others, which would compete with native species and result in a deterioration of ecological conditions. Under some circumstances, noxious weeds could be numerous enough to interfere with revegetation or could invade natural vegetation and agricultural lands outside the disturbed area. Ground disturbing projects like the Proposed Action can introduce invasive weeds if heavy equipment and other vehicles carry weed seeds and vegetative propagules from infested locations to the Project Area.

Several project activities would help to control the spread of noxious weeds, including revegetation, use of weed-free seed, noxious weed inventories conducted prior to disturbance, periodic monitoring during each growing season, cleaning of equipment before entering the Project Area, and noxious weed identification training for employees. Additionally, Rio Blanco County and Garfield County Special Use Permits would require the control of noxious weeds. Under the Colorado Weed Management Act, landowners are

required to control noxious weeds on lands under their control. If this is not done, the Rio Blanco County weed board would have the authority to enter private lands and perform control measures at EnCana's expense, after notification and a hearing. Given the legal requirement for weed control, a regulatory mechanism that ensures compliance and EnCana's commitment to monitor and control noxious weeds, significant negative impacts from the spread of noxious weeds would be unlikely.

4.8.1.4 Rangeland Resources and Grazing

As described in Section 3.8.4, the Figure Four Project Area occurs within two grazing allotments, including the Piceance Mountain and Fawn Creek grazing allotments. Grazing opportunities would be directly affected by loss of vegetation within the Figure Four Project Area. Grazing animals, including cattle, horses and wildlife, would be temporary displaced from those areas involving temporary construction activities, and longer in those areas where vegetation would be lost for the life of the project (i.e., well pads, compressor stations).

The largest negative impacts to livestock grazing in the Project Area will probably occur from physical and spatial disturbance, noise and fugitive dust from traffic associated with exploration and production activities. These negative impacts will far outweigh any short term loss of forage. These impacts will also tend to be long term in nature.

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4.8.1.5 Wetlands and Riparian Areas

Construction activities near and across wetlands and riparian areas can have several impacts on these resources including increased sediment deposition, removal of sensitive riparian vegetation, water quality degradation, and destruction of wildlife habitat sensitive to these areas.

In order to avoid negative impacts to wetlands and riparian areas, EnCana would comply with all Section 404 guidelines and permitting requirements when construction activities would directly or indirectly affect wetlands and riparian areas within the Project Area. EnCana would cross several creeks including Piceance Creek, East and West Hunter Creek, and Willow Creek. In order to identify the specific distribution and functions and values of wetlands in the Project Area, wetland delineations will be prepared for this project using field surveys and the methods and criteria of the U.S. Army Corps of Engineers 1987 Wetland Delineation Manual (COE 1987). Wetland delineations within the Project Area will be conducted by B&A in June of 2004.

4.8.2 No Action Alternative

4.8.2.1 General Vegetation Impacts

Under the No Action alternative, the Proposed Action would not be implemented. Natural gas resources would only be developed on privately-owned minerals and previously permitted federal wells. Approximately six well pads would be constructed on privately-owned land under the No Action alternative. Current land use practices, such as grazing and recreation would continue. These activities would generate their own vegetation impacts, similar to those historically experienced in the Project Area.

The Project Area would continue to be available for future oil and gas development. Should future development on federal gas resources be proposed, those actions would be subject to a separate NEPA analysis.

4.8.2.2 Special Status Plant Species

Under the No Action alternative, potential impacts to special status plant species would be limited to current activities in the Project Area, such as livestock grazing, direct and indirect impacts from recreation, and new gas development (well pads, roads) on private land.

4.8.2.3 Noxious Weeds

Under the No Action alternative, current trends and conditions with respect to noxious weed infestation in the Project Area would likely continue.

4.8.2.4 Rangeland Resources and Grazing

Current trends with respect to rangelands and livestock grazing would continue under the No Action alternative.

4.8.2.5 Wetlands and Riparian Areas

No project-related impacts would occur under the No Action alternative, since no new pipeline crossings would be constructed across wetlands or associated riparian vegetation.

4.8.3 Mitigation

4.8.3.1 General Vegetation

To assure proper revegetation of disturbed areas after construction activities, EnCana would reseed those areas with a BLM-certified “weed free” seed mixture. These areas would be inspected to confirm revegetation and reseeded, if necessary.

Forest and Woodland resources. From the White River RMP of 1997, Appendix B. 7. All trees removed in the process of construction shall be purchased from the Bureau of Land Management. The trees shall be cut with a maximum stump height of six inches and disposed of by one of the following methods:

- Trees shall be cut into four-foot lengths, down to four inches in diameter and placed along the edge of the disturbance.

- Purchased trees may be removed from federal land for resale or private use. Limbs may be scattered off the area of disturbance but not dozed off.

- Chipped and scattered.

4.8.3.2 Special Status Plant Species

As previously discussed, field surveys for sensitive plants and wetlands would be conducted prior to any project-related surface disturbance. Resources identified during these surveys would be avoided or impacts to them would be minimized through compliance with applicable surface stipulations, COAs, or permit conditions. Surveys would be conducted by a qualified botanist(s).

To reduce the potential for collection of sensitive plant species by third parties, access roads would be closed to public access through installation of locked gates, where recommended by the BLM.

4.8.3.3 Noxious Weeds

In order to prevent the introduction and/or spread of noxious weed species into the Figure Four Project Area the following measures would be implemented:

EnCana and their contractors would power-wash all construction equipment and vehicles prior to the start of construction. Any construction or operational vehicles traveling between the project location and outside areas would be power-washed on a weekly basis. This would reduce the probability that invasive weed seeds would be introduced into the Project Area from infested locations.

During the construction phase of the project, EnCana would implement an intensive reclamation and weed control program after each segment of project completion. EnCana would revegetate in all portions of well pads and the ROW not utilized for the operational phase of the project, as well as any sites within the Project Area determined necessary by the BLM. Reseeding would be accomplished using native plant species indigenous to the Project Area. Post-construction seeding applications would continue until determined successful by the BLM. Weed control would be conducted through an Approved Pesticide Use and Weed Control Plan from the Authorized Officer. Weed monitoring and reclamation measures would be continued on an annual basis (or as frequently as the Authorized Officer determines) throughout the 20 to 30 year life of the project.

4.8.3.4 Rangeland Resources and Grazing

Since range conditions would return to their pre-project state following closure and reclamation of project-related disturbance, no additional Mitigation have been identified for rangeland resources.

4.8.3.5 Wetlands and Riparian Areas

Field surveys for wetlands would be conducted and appropriate permits would be obtained from the COE prior to any project-related surface disturbance. Wetlands and associated riparian vegetation identified during these surveys would be avoided or impacts to them would be minimized through compliance with applicable surface stipulations, COAs, or permit conditions. Surveys would be conducted by a qualified botanist or wetland ecologist.

4.8.4 Mitigation

To assure proper revegetation of disturbed areas after construction activities, EnCana would reseed those areas with a BLM-certified "weed free" seed mixture. These areas would be inspected to confirm revegetation and reseeded, if necessary.

4.8.4.1 Special Status Plant Species

As previously discussed, field surveys for sensitive plants and wetlands would be conducted prior to any project-related surface disturbance. Resources identified during these surveys would be avoided or impacts to them would be minimized through compliance with applicable surface stipulations, COAs, or permit conditions. Surveys would be conducted by a qualified botanist(s).

To reduce the potential for collection of sensitive plant species by third parties, access roads would be closed to public access through installation of locked gates, where recommended by the BLM.

4.8.4.2 Noxious Weeds

In order to prevent the introduction and/or spread of noxious weed species into the Figure Four Project Area the following measures would be implemented:

EnCana and their contractors would power-wash all construction equipment and vehicles prior to the start of construction. Any construction or operational vehicles traveling between the project location and outside areas would be power-washed on a weekly basis. This would reduce the probability that invasive weed seeds would be introduced into the Project Area from infested locations.

During the construction phase of the project, EnCana would implement an intensive reclamation and weed control program after each segment of project completion. EnCana would revegetate in all portions of well pads and the ROW not utilized for the operational phase of the project, as well as any sites within the Project Area determined necessary by the BLM. Reseeding would be accomplished using native plant species indigenous to the Project Area. Post-construction seeding applications would continue until determined successful by the BLM. Weed control would be conducted through an Approved Pesticide Use and Weed Control Plan from the Authorized Officer. Weed monitoring and reclamation measures would be continued on an annual basis (or as frequently as the Authorized Officer determines) throughout the 20 to 30 year life of the project.

4.8.4.3 Rangeland Resources and Grazing

Since range conditions would return to their pre-project state following closure and reclamation of project-related disturbance, no additional Mitigation have been identified for rangeland resources.

4.8.4.4 Wetlands and Riparian Areas

Field surveys for wetlands would be conducted and appropriate permits would be obtained from the COE prior to any project-related surface disturbance. Wetlands and associated riparian vegetation identified during these surveys would be avoided or impacts to them would be minimized through compliance with applicable surface stipulations, COAs, or permit conditions. Surveys would be conducted by a qualified botanist or wetland ecologist.

4.9 WILDLIFE RESOURCES

4.9.1 Proposed Action

The principle potential wildlife impacts likely to be associated with the Proposed Action include: (1) a direct loss of certain wildlife habitat, (2) decreased use of certain habitats through displacement of some wildlife species and habitat fragmentation, (3) a decrease in reproductive success and nutritional condition from increased energy expenditure due to physical responses to disturbance, (4) an increase in the potential for collisions between big game or slow-moving wildlife and motor vehicles, and (5) an increase in the potential for poaching and harassment of wildlife.

4.9.1.1 General Wildlife Species

The initial disturbance of 901.2 acres of wildlife habitat associated with the construction of production wells and related facilities would reduce habitat availability for a variety of common wildlife species. Project implementation would increase the level of habitat loss and fragmentation in the Project Area; however, reduction and partial reclamation of wells pads, roads and pipeline corridors would reestablish 421.2 acres for use by wildlife species. The 480.0 acres long-term reduction in habitat may adversely affect the wildlife species discussed in Section 3.9.1 through reduced foraging habitat, removal of bird nesting habitat, and disturbance and dispersal due to the increase in roads and associated traffic. In addition, drilling operations would potentially expose wildlife species to contaminated water in evaporation ponds.

Despite these potential adverse effects, the impacts would be less for the following reasons:

- Many of the mammal species discussed (e.g., cottontails, jackrabbits, coyotes, skunks, rodents) are habitat generalists, meaning they are not tightly restricted to specific habitat types;
- Despite the incremental and cumulative loss of habitat, most of the bird species discussed are highly mobile and would disperse into surrounding areas and utilize suitable habitats to the extent that they are available; and

- The ability of many of the Project Area species to adapt to oil and gas production activities.

4.9.1.2 Big Game

Elk

Surface disturbances associated with the Proposed Action would result in the direct loss of a total of 892.4 acres of elk habitat of0 which 892.4 acres is summer range; 426.9 acres is winter range; 230.8 acres are winter concentration areas). Because of its limited extent, elk summer range has been designated as critical habitat in the White River Field Office area (USDI-BLM 1994). The removal of 892.4 acres of habitat would result in a 0.13% loss of elk summer range throughout GMU's #31 and #22 (Figure 3-9). This additional impact would not cause disturbance in the field office area to exceed the 10% limitation stated as a planning objective in the White River RMP (BLM 1997a), and therefore no timing restrictions on construction activities will be mandated. In addition to disturbances to summer range, 426.9 acres of winter range and 230.8 acres of winter concentration areas would be disturbed under the Proposed Action. Considering the magnitude of winter ranges across the field office area, the habitat losses produced by the Proposed Action are not expected to have adverse impacts on winter elk populations in the White River Field Office area.

In addition to the direct loss of elk habitat associated with the Proposed Action, human activity associated with drilling activities and increased traffic could temporarily displace elk from the Project Area. Implementation of the Proposed Action would increase traffic volume in the Project Area from 80 vehicles trips/day prior to construction, to 264 vehicles trips/day during development. Following development, traffic volume would then decrease to 20 vehicles trips/day during the operation phases of the project. Increases in traffic volume during the construction phase of the project may increase displacement of elk from otherwise suitable habitat. This displacement would be reduced during the operational phase of the project. Elk commonly avoid areas of human activity and would potentially disperse up to 300 feet from all activity areas (Hollowed, E., personal communication, May 2004). If this avoidance buffer is applied to the Figure Four Project Area facilities, 3,461.1 acres of suitable habitat for this species would be avoided. When this avoidance acreage is added to the overall disturbance acreage, an indirect disturbance total of 4,353.5 acres of potential elk habitat would be lost. The indirect disturbance of 4,353.5 acres of habitat would result in a 0.65% loss of elk summer range throughout GMU's #31 and #22. This would not cause disturbance in the field office area to exceed the 10% limitation stated as a planning objective in the White River RMP (BLM 1997a), and therefore no timing restrictions on construction activities will be mandated.

Generally, gregarious animals are more severely affected by a disturbance than are solitary species; and hunted species will exhibit a greater avoidance of road-related disturbances than species that are not hunted (PRISM Environmental Management Consultants 1982). Project development in the Figure Four area is estimated to increase surface roads by 50%. This overall increase in road surfaces would allow greater access to the area, and would therefore

likely increase hunting and recreational activities. These activities may potentially increase the direct mortality (including legal hunting, poaching, and collisions with vehicles) of elk, as well as indirectly add to displacement of these species in the area.

Mule Deer

Surface disturbances associated with the Proposed Action would result in the direct loss of a total of 892.4 acres of mule deer habitat, of which 892 acres is summer range; 21.8 acres is winter range; and 2.4 acres is severe winter range). Because of its limited extent, mule deer summer range has been designated as critical habitat in the White River Field Office area (USDI-BLM 1994). The removal of 892.4 acres of habitat would result in a 0.10% loss of mule deer summer range throughout GMU's #31 and #22 (Figure 3-10). This additional impact would not cause disturbance in the field office area to exceed the 10% limitation stated as a planning objective in the White River RMP (USDI-BLM 1994), and therefore no timing restrictions on construction activities will be mandated. In addition to disturbances to summer range, 21.8 acres of winter range and 2.4 acres of severe winter range would be disturbed under the Proposed Action. Severe winter habitat would only be disturbed for a brief period, as the Hunter Creek pipeline is buried, and affects of this development are not likely. Overall, considering the minimal amount of disturbance to these ranges, along with their magnitude across the field office area, the habitat losses produced by the Proposed Action are not expected to have adverse impacts on winter mule deer populations in the White River Field Office area.

In addition to the direct loss of mule deer habitat associated with the Proposed Action, human activity associated with drilling activities and increased traffic could temporarily displace mule deer from the Project Area. Implementation of the Proposed Action would increase traffic volume in the Project Area from 80 vehicles trips/day prior to construction, to 264 vehicles trips/day during development. Following development, traffic volume would then decrease to 20 vehicles trips/day during the operation phases of the project. Increases in traffic volume during the construction phase of the project may increase displacement of mule deer from otherwise suitable habitat. This displacement would be reduced during the operational phase of the project. Mule deer commonly avoid areas of human activity and would potentially disperse up to 300 feet from all activity areas (Hollowed, E., personal communication, May 2004). If this avoidance buffer is applied to the Figure Four Project Area facilities, 3,461.1 acres of suitable habitat for this species would be avoided. When this avoidance acreage is added to the overall disturbance acreage, an indirect disturbance total of 4,353.5 acres of potential mule deer habitat would be lost. The removal of 4,353.5 acres of habitat would result in a 0.49% loss of elk summer range throughout GMU's #31 and #22. This would not cause disturbance in the field office area to exceed the 10% limitation stated as a planning objective in the White River RMP (BLM 1997a), and therefore no timing restrictions on construction activities will be mandated.

Generally, gregarious animals are more severely affected by a disturbance than are solitary species; and hunted species will exhibit a greater avoidance of road-related disturbances than species that are not hunted (PRISM Environmental Management Consultants 1982). Project development in the Figure Four area is estimated to increase surface roads by 50%. This

overall increase in road surfaces would allow greater access to the area, and would therefore likely increase hunting and recreational activities. These activities may potentially increase the direct mortality (including legal hunting, poaching, and collisions with vehicles) of mule deer, as well as indirectly add to displacement of these species in the area.

4.9.1.3 Waterfowl and Upland Game Birds

The upland game bird species of most concern in the Figure Four Project Area is the greater sage-grouse, which is classified as a Species of Special Concern by the CDOW, and proposed for federal listing as a Threatened or Endangered species. The effects of the Proposed Action on the greater sage-grouse are discussed in detail in Section 4.9.5 (Special Status Wildlife Species).

Besides the greater sage-grouse, waterfowl and upland game birds found in the Project Area are widely distributed and are found throughout most of Colorado. Despite this characteristic, habitat use is limited within the Project Area most likely because of the minimal amount of existing water sources in the area. Given these circumstances, it is likely that uncovered evaporation ponds developed during drilling periods could attract waterfowl and upland game birds. Pits would be netted with fine mesh to preclude bird use.

Project development in the Figure Four area is estimated to increase surface roads by 50%. This overall increase in road surfaces would allow greater access to the area, and would therefore likely increase hunting and recreational activities. These activities may potentially increase the direct mortality (including legal hunting, poaching, destruction of nests, and collisions with vehicles) of waterfowl and upland game birds, as well as indirectly add to displacement of these species in the area. In addition to human related direct mortality, coyote predation would also be increased. Coyotes readily use roadways (particularly traveled/compacted roadways) as winter travel corridors. As the road volume in the Project Area increased, so would the potential for coyote/prey interactions.

Implementation of the Proposed Action would increase traffic volume in the Project Area from 80 vehicles trips/day prior to construction, to 264 vehicles trips/day during development. Following development, traffic volume would then decrease to 20 vehicles trips/day during the operation phases of the project. This overall increase in traffic volume may increase displacement of waterfowl and upland game birds from otherwise suitable habitat. In a study examining how anthropogenic factors affect habitat usage by lesser prairie-chickens, Robel et al (2003) describe 95% of all chickens avoiding active roads by 50 meters. If this avoidance buffer is applied to the Figure Four Project Area roads, 5,578 acres of suitable habitat for these species would be avoided. When this avoidance acreage is added to the overall disturbance acreage, a total of 6,470.4 acres of potential habitat for waterfowl and upland game species would be lost.

Given the Applicant Committed Environmental Protection measures described in Section 2.2.7, as well as the implementation of additional Mitigation described below in Section 4.9.3, the Proposed Action would not adversely affect these species.

4.9.1.4 Raptors

A variety of raptors inhabit the Project Area and make use of all habitats present. Buys & Associates 2004 raptor inventory of the Figure Four Project Area identified a total of 17 active raptor nests. None of these nests belong to special status raptors. Possible effects of the Proposed Action on raptor species include: (1) increased direct mortality (including poaching and collisions with vehicles), (2) direct loss or degradation of potential nesting and foraging habitats, and (3) indirect disturbance from human activity (including harassment, displacement, and noise).

Project development in the Figure Four area is estimated to increase surface roads by 50%. This overall increase in road surfaces would allow greater access to the area, and would therefore likely increase hunting and recreational activities in the Figure Four Project Area. These activities may potentially increase the direct mortality (including poaching and collisions with vehicles) of raptors, as well as indirectly add to displacement of these species in the area.

As described in Section 3.9.4, to minimize the effects of project development on raptors, 27 well pads and associated roads and pipelines were moved or re-routed from their proposed locations. These movements were aimed at avoiding aspen groves, and pinyon-pine/juniper woodlands that represent potential raptor nesting habitat. Despite these efforts, project development in the Figure Four area would eliminate 72.4 acres of aspen and 24.2 acres of pinyon-pine/juniper woodlands. Although these losses would eliminate potential nesting areas for raptor species, these losses would be minimal in comparison to the magnitude of these woodland areas across the Project Area. In addition to disturbances to raptor nesting habitat, approximately 784.4 acres of raptor foraging habitat (i.e., mountain shrubland, sagebrush steppe) would also be eliminated.

Implementation of the Proposed Action would increase traffic volume in the Project Area from 80 vehicles trips/day prior to construction, to 264 vehicles trips/day during development. Despite traffic increases, no surface disturbance would be allowed within ¼-mile of active raptor nests during the nesting season. Following construction, traffic would be decreased to 20 vehicle trips/day. All traffic occurring in the Project Area has the potential to disturb nesting or roosting raptors and may cause raptors to disperse from the area for short-periods of time.

Given the Applicant Committed Environmental Protection measures described in Section 2.2.7, as well as the implementation of additional Mitigation described below in Section 4.9.3, the Proposed Action would not adversely affect raptor species.

4.9.1.5 Fisheries

Construction activities associated with the Proposed Action, would result in temporary, construction-related increases in erosion, which in some locations could be transported to drainages such as Willow, Hunter, and Piceance Creeks. Construction-related erosion would be minimized by implementing Best Management Practices (e.g., silt fencing, straw bales, culverts).

Accidental or unintentional releases of natural gas condensate into stream systems may have acute effects (e.g., mortality) or chronic effects (e.g., growth, reproduction) on fishery resources. The most toxic components of condensate are the low-end aromatic compounds (e.g., benzene, naphthalene). The larger carbon compounds, such as polycyclic aromatic hydrocarbons (PAHs), may cause chronic (long-term) effects on exposed fish (Odell 1997). However, under the Proposed Action, such direct releases of petroleum products into Project Area streams are not likely. Condensate tanks would be installed within earthen berms to contain at least 110% of their capacities, should a leak, spill, or failure occur. In addition, closed-loop drilling systems would be used so that no drilling mud or production water would be discharged into Project Area drainages. The closed-loop system would prevent any introduction of water or contaminants from construction and drilling activities to Project Area drainages. Standard industry materials and safety measures for the installation of pipeline and well pad facilities (e.g., Spill Prevention and Countermeasure and Control Plan, Storm Water Management Plan) would be implemented to minimize the risk of accidental spills or introduction of contaminants from operational activities to Project Area drainages.

Implementation of the Proposed Action would not impair water quality (and therefore, fishery resources) in Willow, Hunter, Piceance Creek or other surface waters. Pipeline corridors may cross these water sources however construction would follow Best Management Practices and would be designed to withstand water levels associated with a one hundred year flood.

The thick impermeable layers of rock in the top section of the Mesaverde and Wasatch Formations make it virtually impossible for hydrocarbons or water produced from drilling operations to either contaminate groundwater zones or for such drilling operations to deplete the potable water zones occurring near the surface.

4.9.1.6 Migratory Birds

Impacts to migratory birds in the Figure Four Project Area would be dependent upon the seasons of construction and the drilling of each well. If construction and drilling of the proposed well pads and wells were completed in the late summer months (i.e., August – September), many of the migratory species would have left the Figure Four Project Area for southern wintering grounds, or at least would have fledged Project Area nests. Disturbance during this time would be temporary, and project-related impacts would not likely have a measurable impact on migratory bird populations as a whole or individual species in general. If the proposed well construction and drilling were to occur during the peak nesting months in spring/summer, the Proposed Action could result in some nest abandonment, direct mortality, reproductive failure, displacement of birds, and destruction of nests. This would have a greater impact on high-priority migratory bird species that may be nesting in the Project Area due to the smaller population size and limited distribution found in these species. Ground-nesting bird species would be susceptible to nest destruction and mortality due to vehicle traffic and equipment placement. Shrub nesting species may also be affected due to destruction of shrubs. Tree-nesting birds would be affected to a lesser extent as removal of trees would be limited. In addition, evaporation ponds located at drilling sites

could potentially expose birds to contaminated waters, as birds would potentially use these ponds for bathing and as insect foraging areas.

4.9.2 No Action Alternative

Under the No Action alternative, the Proposed Action would not be implemented. Natural gas resources would only be developed on privately-owned minerals and previously permitted federal wells. Approximately six well pads would be constructed on privately-owned land under the No Action alternative. Current land use practices, such as grazing and recreation would continue. These activities would generate their own impacts, similar to those historically experienced in the Project Area.

The principle wildlife effects likely to be associated with these activities under the No Action alternative include: (1) decreased use of certain habitats through displacement of some wildlife species and habitat fragmentation near well locations and access roads; (2) a potential for illegal kill and harassment of wildlife; and (3) the potential for collisions between big game or slow moving wildlife and motor vehicles. However, these effects are negligible given current development levels, and would be substantially less than would be the case under the Proposed Action.

4.9.2.1 General Wildlife Species

As the 901.2 acres proposed for access road/pipeline corridor and well pad locations under the Proposed Action would not be disturbed under the No Action alternative, general wildlife species would only be affected by associated human activity including recreation, vehicular traffic and existing/future oil and gas development. Under the No Action alternative an estimated 58.2 acres of wildlife habitat is scheduled to be developed for oil and gas development on private land within the Figure Four Project Area. This disturbance along with increases in traffic in the area, while slight compared to the Proposed Action, would increase disturbance to numerous wildlife species, however, this disturbance is not likely to result in a loss of viability of the field office area, nor cause a trend to federal listing or a loss of species viability rangewide**.**

4.9.2.2 Big Game

Surface disturbances associated with existing gas wells, roads, pipelines, and ancillary facilities have resulted in the loss of summer and winter habitat for elk and mule deer. The loss of habitat would continue until disturbed areas are reclaimed. Future oil and gas development on private lands in the Figure Four Project Area (58.2 acres) would contribute to this loss of habitat, and would also increase physical disturbances to these species.

4.9.2.3 Waterfowl and Upland Game Birds

The primary effect on waterfowl and upland game birds from existing oil and gas related activities is exposure to waste water and drilling fluids. These impacts would be substantially less under the No Action alternative, however as future sites are developed on private land (18 wells; 6 pads) these impacts would continue to occur.

4.9.2.4 Raptors

The primary effect on raptors from existing oil and gas related activities is potential disturbance during the nesting season. Raptors using habitats near existing activity have likely either adapted to the presence of humans and noise associated with the production and maintenance activities or moved to adjacent habitats. All future oil and gas development occurring in the Project Area would require raptor surveys before construction. If nest sites are found, construction activities would adhere to timing restrictions as well as spatial buffers.

4.9.2.5 Fisheries

All effects (i.e., increases in erosion, and potential for accidental releases of contaminant into stream systems) associated with the No Action alternative would be similar to that under the Proposed Action, however, the extent and potential for these effects to occur would be substantially less.

4.9.2.6 Migratory Birds

The primary effect on migratory birds from existing oil and gas related activities is potential disturbance during the nesting season. Migratory birds using habitats near existing activity have likely either adapted to the presence of humans and noise associated with the production and maintenance activities or moved to adjacent habitats. Existing oil and gas facilities have likely reduced the area for potential nesting sites. In addition, exposure to waste water and drilling fluids may be greater under the no action alternative as evaporation ponds at current or future facilities may not possess preventative netting.

4.9.3 Mitigation

For all wildlife occurring in the Figure Four Project Area, the following mitigation would be implemented:

All EnCana and contract employees would be prohibited from carrying firearms or bringing dogs to the Project Area.

In order to reduce incidents of illegal kill and harassment of wildlife, all EnCana personnel and contract employees should be instructed on BLM regulations and state wildlife laws. Personnel would also be instructed at a pre-construction meeting about the nature of the wildlife species that occur on the work site, potential impacts to these species, and measures that should be taken to avoid or minimize impacts.

EnCana would utilize remote telemetry equipment to reduce the frequency of well site visits, which would partially mitigate the potential for wildlife/vehicle collisions and effects of animal displacement due to increased traffic and human presence. The use of remote telemetry would reduce traffic volumes by 75% (4 roundtrips/day - 3 light trucks and 1 heavy truck), compared with approximately 16 trips/day in the Figure Four well field if telemetry were not used.

EnCana would limit the unauthorized public use of access roads via gates/barriers to minimize recreational use of previously isolated areas, thus reducing wildlife/human interactions and potential conflicts. Gates would be placed at BLM property boundaries and at ridgeline access points. Foot travel would be allowed, however vehicular access would only be allowed by EnCana employees visiting wells sites, and by grazing allotment owners.

4.9.3.1 Big Game

The effects of elk and mule deer habitat reduction would be partially mitigated through interim reclamation of pipeline ROWs and unutilized well pad areas by planting native herbaceous and shrub seed mixtures beneficial to these species. Methods of reclamation are discussed in detail in Chapter 2.

4.9.3.2 Waterfowl and Upland Game Birds

In order to reduce the possibility of exposure to waste water and drilling fluids, all reserve pits would be netted to prevent birds from entering contaminated waters. According to the USFWS, a maximum mesh size of 1 1/2 inches will allow for snow-loading and will exclude most birds. Netting should be suspended a minimum of 4 to 5 feet from the surface of the pond to prevent the net from sagging into the pond during heavy snow-loads. Side nets would also be used to prevent ground entry of waterfowl, upland game birds, and other wildlife species.

In winter, snow compacted roads are used by coyotes as travel corridors. Compacted roads aid these predators by allowing faster travel during pursuit of prey. To minimize the potential for winter mortality of waterfowl and upland game birds from coyote predation, snowmobiles would be used to access well pads, therefore minimizing the amount of snow compaction on Project Area roads.

4.9.3.3 Raptors

Resource Identification - As described in Section 3.9.4 of this document, current raptor habitat usage in and adjacent to the Project Area has been identified. EnCana would conduct to an annual raptor nest inventory of their Figure Four Project Area and a one-mile radius during the 3-year drilling and construction phase. The raptor nest inventory would be completed in the late-April or early-June of each year in order to determine the activity status of existing raptor nests and any new nests. This inventory would consist of ground surveys to document the activity of previously identified raptor nests as well as to potentially identify additional nesting species. Data from these annual surveys would then be provided to EnCana, the USFWS, and the BLM.

Habitat Management – Based on the existing and potential raptor habitats within the Project Area, it is recommended that the following measures be implemented to mitigate some of the effects of the Proposed Action on raptor foraging and nesting habitat:

EnCana would commit to retaining live trees and snags within the Project Area as hunting perches for raptors. Prey species also use trees and snags as nesting areas, food sources, and

over-wintering habitat. EnCana would reclaim disturbed areas and obliterate roads as soon as possible following construction, operation, and completion of project activities.

4.9.3.4 Migratory Birds

In order to reduce the possibility of exposure to waste water and drilling fluids, all reserve pits would be netted to prevent birds from entering contaminated waters. According to the USFWS (2004), a maximum mesh size of 1 1/2 inches will allow for snow-loading and will exclude most birds. Netting should be suspended a minimum of 4 to 5 feet from the surface of the pond to prevent the net from sagging into the pond during heavy snow-loads. Side nets would also be used to prevent ground entry of waterfowl, upland game birds, and other wildlife species.

4.9.4 Special Status Wildlife Species

4.9.4.1 Proposed Action

Bald Eagle

Currently, no bald eagle nests have been observed within the Project Area, and due to the habitat characteristics of the area, occurrence is not likely. The primary effects of the Proposed Action to bald eagles would include increased potential for vehicular collisions, decreased foraging habitat, and the possible displacement away from and/or destruction of roosting habitat. Given the Applicant Committed Environmental Protection measures described in Section 2.2.7, the Proposed Action would not adversely affect bald eagles.

Greater Sage-Grouse

Although anecdotal evidence has established that gas-oil development can cause sage grouse populations to decline, the reasons for declines are still unknown (Braun 1987). Some potential impacts of development to sage-grouse include: (1) direct habitat loss from well, road, and pipeline construction, (2) increased human activity causing avoidance and displacement, (3) direct mortality from poaching, vehicular collisions and predation, and (4) fragmentation causing avoidance and displacement. (Braun 1987) maintains that gas and oil development may have negative short-term (site preparation and drilling), and long-term (road development) effects.

Direct Habitat Loss

Surface disturbances associated with the Proposed Action would result in the direct loss of approximately 878.2 acres of sage-grouse habitat (661.7 acres winter habitat; 878.2 acres of overall habitat). Although sage-grouse habitat exists across the entire Project Area, not all habitat in the area is used by sage-grouse. Sage-grouse are a sagebrush (*Artemisia* spp.) obligate, and rely almost exclusively on sagebrush steppe ecosystems for leks, nesting sites, feeding sites, rearing sites, protection and wintering grounds. Approximately 11,789 acres of sagebrush steppe habitat exists in the Project Area. As mentioned in Section 3.9.6.1, a total of 8 well pads and associated road and pipeline ROWs were moved in an attempt to avoid or

minimize the disturbance and fragmentation of sage-grouse (i.e., sagebrush steppe) habitat. Despite attempts to minimize disturbances to these habitats a total of 589.4 acres of sagebrush-steppe habitat would be disturbed under the Proposed Action.

Sage-grouse have been identified in the Project Area and lek, nesting and brooding habitat does exist throughout the Project Area. Sage-grouse brooding habitat usually occurs in areas with abundant forbs and insects including wet meadows, farmland and riparian areas adjacent to sagebrush. Brooding areas do occur within the riparian corridors of Willow and Hunter Creek. There are no known sage-grouse leks within the immediate Project Area; however, 3 leks are located within 2 miles of the Project Area boundary. Lek sites typically occur in open areas surrounded by sagebrush (Patterson 1952; Gill 1965), and nesting usually occurs within 2 miles of a known lek. Most sage-grouse nests occur under sagebrush, but sage-grouse will nest under other plant species. In general, nests are placed under shrubs having larger canopies and more ground and lateral cover. Both nesting and lek habitat is found in the Project Area in the following legal sections (T4S; R98W; Sections 7, 19-20, 26-29, and 34-35). Disturbance to these areas could cause lek abandonment. As sage-grouse typically do not return to abandoned leks, and in the context of the current population status of this species, the destruction of potential lek habitat could significantly impact population trends. In addition to lek and nesting habitat, brood-rearing areas are vital to sage-grouse annual recruitment, and destruction of these areas could lead to local population declines. Given the mitigation described in Section 4.9.4.3, disturbances of these habitats would not occur during the breeding season and effects to sage-grouse would therefore be minimized.

Disturbance and Displacement

Numerous studies have determined that sage-grouse are affected by human activity (Lyon and Anderson 2003; Holloran and Anderson 2002; Remington and Braun 1991; Braun 1987; Braun 1986). These studies determined that hens nested farther away from leks in areas where human disturbance occurred, and that nesting initiation rates were also lower. In addition, it was also determined that male attendance at leks was lower when human activity occurred within 3.2km. Despite these trends, Remington and Braun (1991) reported that sage-grouse were displaced by surface disturbing activities but returned to fluctuating pre-disturbance levels once activity ceased. Lyon and Anderson (2003) also stated that although disturbed areas had lower initiation rates than undisturbed areas, nest success between the two areas was the same. Despite these findings, there is no evidence that populations attain their pre-disturbance levels, and population reestablishment could require 20-30 years (Braun 1998).

Once a gas well has been drilled, most of the disturbance within a natural gas field is traffic-related. Implementation of the Proposed Action would increase traffic volume in the Project Area from 80 vehicles trips/day prior to construction, to 264 vehicles trips/day during development. Following development, traffic volume in the well field would then decrease to 4 vehicles roundtrips/day (using remote telemetry) during the operation phases of the project. This traffic volume may increase displacement of sage-grouse from otherwise suitable habitat. Lyon and Anderson (2003) determined that traffic disturbance of 1-12 vehicles per day during the breeding season may reduce nest-initiation rates and increase

distances from leks during lek-site selection. In addition, (Ingelfinger 2001) determined that sagebrush obligate bird densities were reduced within 100m of a road, regardless of traffic volumes. If this buffer is applied to the Figure Four Project Area roads, bird densities would be decreased in approximately 2,233.4 acres of suitable habitat. When this avoidance acreage is added to the overall disturbance of sagebrush steppe habitat, a total of 2,822.8 acres of potential habitat would be degraded for sage-grouse use.

Noise from construction activities would also affect sage-grouse during the period those activities are taking place at a given location. It is likely grouse would be temporarily displaced by this noise and other human activities as described above until construction were completed. Following construction, the primary source of noise in the project area would be the compressor stations, as described in Section 4.7. The two proposed compressor station sites are located in the Hunter Creek valley bottom, and not in sage-grouse habitat. Thus, long-term noise-related impacts to sage-grouse in the Project Area would be negligible.

Direct Mortality

Project development in the Figure Four area is estimated to increase surface roads by 50%. This overall increase in road surfaces would allow greater access to the area, and would therefore likely increase hunting and recreational activities in the Figure Four Project Area. These activities may potentially increase the direct mortality (including poaching, and collisions with vehicles) of sage-grouse, as well as indirectly add to displacement of these species in the area. In addition to human related direct mortality, coyote predation would also be increased. Coyotes readily use roadways (particularly traveled/compacted roadways) as winter travel corridors. As road volume in the Project Area is increased, so would the potential for coyote/sage-grouse interactions.

Habitat Fragmentation

The topography in the Figure Four Project Area consists of numerous narrow (< 300 ft.) ridgeline benches running from south to north, separated by steep sloping hillsides and relatively flat bottoms. The majority of the sage-grouse habitat in the Project Area occurs primarily on the narrow sagebrush covered benches in the southern and western portions of the area. Although these contiguous sagebrush habitats do occur in the area, they are isolated because of the rolling topography. If well pads and roads are developed on these benches, sagebrush habitats would become substantially less contiguous and habitat "islands" would be created. Since sage-grouse typically avoid areas of human disturbance, travel between these islands and overall habitat usage would be reduced.

Endangered Colorado River Fish

The Colorado River Endangered Fish species (i.e., Colorado squawfish, razorback sucker, humpback chub, and bonytail chub) are affected by activities that deplete or degrade the flow of downstream waters into the Colorado River (U.S. Fish and Wildlife Service 1990a, 1990b). Consumptive water use reduces flows throughout the Colorado River watershed, leading to cumulative habitat losses for these species. While several small drainages occur within the Figure Four Project Area, none of these drainages provide the habitat elements

required by the Colorado River Endangered Fish. Therefore, direct impacts (i.e., erosion, sediment yield, and potential spills) to the Colorado River Endangered Fish are not likely to occur as a result of the Proposed Action. The species would be affected by project-related depletion of the Colorado River system. Up to 125 acre-feet of water would be collected annually from Piceance Creek and/or the White River to facilitate drilling efforts in the Figure Four Project Area. According to the *Programmatic Biological Opinion for Minor Water Depletions in Colorado* (USFWS 1994), any water depletions under 125 acre-feet per year are considered minor depletions and do not necessitate further consultation. However, all depletions to the Upper Colorado River Basin require a one-time depletion fee of $15.93/acre-foot to be paid to the National Fish and Wildlife Foundation.

4.9.4.2 No Action Alternative

Bald Eagle

Although no known bald eagle nest sites would be disturbed under the No Action alternative, disturbance to roosting and foraging habitat could occur as a result of previously permitted projects, as well as future development. Increased traffic and human disturbance may cause eagles to displace from the area, and the potential for mortality from vehicle collisions and poaching would also continue.

Endangered Colorado River Fish

Under the No Action alternative, consumptive water depletions would occur from the Upper Colorado River Basin, however, these depletions (35 acre-feet/year), would be less than that of the Proposed Action (125 acre-feet/year).

4.9.4.3 Mitigation

Greater Sage-Grouse

Based on the existing and potential sage-grouse habitats within the Project Area, it is recommended that the following measures be implemented to mitigate some of the effects of the Proposed Action on sage-grouse brooding and nesting habitat:

All roads and well pads in designated sage-grouse habitat will be minimized to disturb the least amount of potential habitat.

No ground disturbing activities would occur in Sections 7, 19-20, 26-29, and 34-35 from March 1 to July 15. Light non-ground-disturbing activities and vehicular traffic is allowable within this area from March 1 to July 15.

To minimize the effects of increased hunting and recreational access due to increased road surfaces in the Project Area, numerous gates would be installed to prevent vehicular and ATV travel. These gates would be placed at 16 locations, primarily along BLM property boundaries and adjacent to ridgeline access points. Foot travel would be allowed, however

vehicular access would only be allowed by EnCana employees visiting wells sites, and by grazing allotment owners.

In order to reduce the possibility of exposure to waste water and drilling fluids, all reserve pits would be netted to sage-grouse from entering contaminated waters. According to the USFWS, a maximum mesh size of 1 1/2 inches will allow for snow-loading and will exclude sage-grouse and other bird species. Netting should be suspended a minimum of 4 to 5 feet from the surface of the pond to prevent the net from sagging into the pond during heavy snow-loads. Side nets would also be used to prevent ground entry.

As mentioned previously, EnCana would utilize remote telemetry equipment to reduce the frequency of well site visits, which would partially mitigate the potential for sage-grouse displacement due to increased traffic and human presence. The use of remote telemetry would reduce traffic volumes by 75% (4 roundtrips/day - 3 light trucks and 1 heavy truck), compared with approximately 16 trips/day in the Figure Four well field if telemetry were not used.

EnCana would commit to an interim/post production reclamation program designed to reestablish sagebrush, as well as forb species in all disturbed areas throughout the Project Area. Interim reclamation would consist of both replanting sagebrush and forbs in disturbed areas as well as treatment/conversion of other brush communities (i.e., serviceberry, oak) to sagebrush. Specific habitat goals will be determined by the BLM.

EnCana would commit to an off-site mitigation program to compensate for unavoidable disturbances to sage-grouse winter range, as well as nesting (sagebrush steppe habitat) and brooding habitat (riparian habitat). The specific components of the off-site mitigation program were developed by the BLM and the CDOW and are as follows:

1. Encana would contribute $17,000 per year for the next three years to partially fund a study of sagebrush habitat directly adjacent to, and possibly partially within, the Figure Four Unit. The study would involve hiring two summer technicians to obtain and compile baseline information into a Piceance Basin sage grouse habitat assessment to include; canopy cover, herbaceous ground cover, plant composition, effective height, and identification of wet areas. This study will involve use of the Daubenmire Method and other measurement techniques and will tell biologists what exists on the ground, what to treat in the future, and how to treat it. The rationale for conducting the majority of this study outside and/or adjacent to the unit is related to the fact that by the time the individuals are hired, the field development will be well under way, precluding obtaining pre-development baseline information. The studies will include areas of known grouse use to the west and northwest as well as east and southeast of the unit.

2. Encana will provide an additional $10,000 per year for the life of the field to partially fund direct habitat improvement projects for sage-grouse to include hydro axe and burning treatments, depending on the prerogative of BLM and CDOW for specific sites. Efforts will be made to make the habitat improvements within or adjacent to

the Figure Four Unit. However, this $10,000 may also be used for off-site mitigation habitat manipulations in different areas of grouse use within the Piceance Basin including, but not limited to, the Magnolia Area.

3. These mitigation requirements apply to Encana as well as any successive owner/operator of this lease for the operational life of the field.

4. These figures were derived from an estimate of what is needed to provide reasonable and effective habitat assessment and treatment to maintain the sage grouse population in the Piceance Basin through the period of this field development and operation. It sets aside the need for ongoing complex calculations of sage-grouse habitat directly and indirectly impacted by this development. These measures do not preclude the occasional advantageous movement of pads, roads and other infrastructure derived from on-site visits.

Endangered Colorado River Fish

As previously stated, under the Upper Colorado River Endangered Fish Recovery Program, new water depletions of 125 to 4,500 acre-feet require additional consultation with the USFWS, and require a one-time fee of $15.93 per acre-foot to compensate for impacts resulting from the depletion. This money is used along with other funds to provide habitat improvements to aid in recovery. Up to 125 acre-feet of water would be collected annually from Piceance Creek to facilitate drilling efforts in the Figure Four Project Area. Therefore a one-time fee of $1,991.25 would be paid to the National Fish and Wildlife Foundation.

4.10 CULTURAL RESOURCES

4.10.1 Proposed Action

The primary cultural resources issue for the proposed project is the potential for impacts to significant prehistoric and historic sites, and to traditional cultural properties. Prehistoric and historic sites and traditional cultural properties are considered significant if they are listed in or eligible for inclusion on the National Register of Historic Places (NRHP). By definition, isolated finds are usually not considered for listing.

There are a variety of types of sacred sites and locations that are considered significant to Native American and other ethnic groups. The term “traditional cultural properties” is used to refer to these types of sites. Native American access to sacred sites for the purpose of worship or their ceremonial use is protected by the American Indian Religious Freedom Act (AIRFA) of 1978. If any such sites are identified, the BLM would comply with AIRFA and ensure continued access by the individuals or groups.

The Native American Graves Protection and Repatriation Act (NAGPRA) of 1990 requires federal agency consultation with Native American groups concerning activities that may affect archaeological resources of importance to the Native American groups. This law pertains particularly to the treatment of human remains but also relates to other cultural items recovered during archaeological investigations. NAGPRA also requires that Native

American groups be consulted before a permit for site excavation under Archaeological Resources Protection Act (ARPA) is issued.

Impacts to cultural resources may occur as a result of several project-related activities. Direct impacts may result from road construction, well pad development, grading, and pipeline trench excavation. Potential impacts occurring as an indirect result of the proposed action include, but are not necessarily limited to, surface collecting of sites and localities by project personnel and cumulative, long-term degradation as a result of improved public access into the Project Area.

The Advisory Council on Historic Preservation (ACHP) has set procedures (36 CFR 800) to be followed to determine the effect a project may have on cultural resources that are listed in or eligible for listing in the National Register of Historic Places (NRHP) and how to mitigate that effect if it is determined to be adverse. If any site(s) currently on or eligible for nomination to the NRHP is present in the APE, steps must be taken to avoid or mitigate adverse impacts to the cultural property. When no sites or properties eligible to or listed on the NRHP are located in the Area of Potential Effects (APE), the Proposed Action can be determined to have "No Historic Properties Present," and the action can be allowed to proceed with no further archaeological work.

Direct disturbance or destruction of significant cultural resource sites would take place within any areas subject to direct disturbance from development. Direct impacts would occur during the construction and drilling phases of the project. Additional direct impacts to cultural resources are not anticipated during the production phase or during the final reclamation and abandonment phase, providing that ground disturbance is restricted to areas previously disturbed by construction and well development.

BLM Class III cultural resources inventories were conducted for the proposed well field area and the proposed Hunter Creek main gas gathering pipeline corridor in two separate surveys, respectively (Metcalf Archaeological Consultants, Inc. 2003, 2004). The well field inventory was carried out in September and October 2003 and resulted in the identification of just six prehistoric isolated finds located on ridge top locations in heavily eroded soils. These isolated finds are by definition ineligible for inclusion on the NRHP.

As described in Section 3.10.2, the Class III inventory of the Hunter Creek main gas gathering pipeline corridor was carried out in April 2004, and resulted in the evaluation of three historic sites, a rock shelter site of unknown age, one prehistoric isolated find, and one historic isolated find. The two isolated finds are ineligible for the NRHP. Of the four sites identified, the three historic sites have been recommended as ineligible, and additional data are required in order to determine the NRHP status of the rock shelter site. Sites with undetermined eligibility should be treated as if they were eligible until such data are gathered to determine otherwise.

The rock shelter site (5RB848) has been evaluated as needing data for a determination of NRHP eligibility. Provided that the proposed Hunter Creek main gas gathering pipeline corridor can be routed such that the area of disturbance is located entirely on the opposite

(east) side of Hunter Creek Road, the proposed pipeline would have no adverse effect on potentially significant cultural resources in the area of potential effect.

Construction activities in the Project Area could reduce the value of Native American traditional use or religious areas that may be present in or near the Project Area. No Native American traditional use or religious areas are known at this time. The BLM would continue to coordinate with the Northern Ute Tribe to identify these areas and assure their protection.

4.10.2 No Action Alternative

Since the only significant cultural site was identified along Hunter Creek Road, and the Hunter Creek gas gathering pipeline would not be built as part of the No Action alternative, no impact to cultural resources would occur.

4.10.3 Mitigation

If site (5RB848) cannot be avoided by relocation of the pipeline to the east side of Hunter Creek Road in the vicinity of the site, and should the BLM, in consultation with the SHPO and the ACHP, agree that site (5RB848) is potentially eligible for the NRHP and that it may be adversely affected, then a Treatment Plan that outlines "courses of action that could avoid, mitigate, or minimize any adverse effects on such properties" [36 CFR 800.6 (b)(3)] would be formulated and executed.

Since no traditional cultural properties have been identified in the Figure Four Project Area, no Mitigation would be required.

4.11 LAND USE AND AREAS OF CRITICAL ENVIRONMENTAL CONCERN

4.11.1 Land Use

4.11.1.1 Proposed Action

Implementation of the Proposed Action would introduce additional natural gas wells, roads, pipelines and associated production facilities into the Project Area above and beyond the thirteen natural gas wells that exist or are currently under development. The following are potential impact issues for land use in the Project Area:

- Displacement of existing land uses in the Project Area;
- Potential conflicts with other existing utilities and rights of way (ROWs) in the Project Area that could arise from construction and installation of project-related well pads, roads, and pipelines; and
- Conflicts with applicable land use plans or policies established by BLM, or the local counties.

The proposed construction, drilling, and production activities (including traffic, construction and drilling noise, and human presence) would result in short-term impacts and possibly displacement of other land uses in the Project Area, such as livestock grazing, hunting and

other dispersed recreation, and wildlife uses of the Project Area. Livestock grazing would be displaced to some extent by vehicle traffic in and out of the Project Area. Ranchers would likely have to relocate their herds from areas where vehicle traffic could result in collisions and mortality of livestock. During project construction and well drilling and completion, project related noise, dust, and traffic could displace recreational users of affected portions of the Project Area who prefer a natural, unaltered setting. Similarly, wildlife uses of the Project Area would likely be displaced to other quieter locations with less human activity. Following the end of project construction and well drilling and completion, many of these land uses would return because traffic, dust, noise, and general human activity would diminish substantially.

Despite short-term impacts to grazing, recreation and wildlife uses of the Project Area, there would be no displacement of occupied residences, cabins, or other ranching-related structures due to construction of the Proposed Action. Since there are no prime or unique farmlands in the Project Area, there would be no impacts to these resources as a result of the Proposed Action.

As described in Section 3.11, the Project Area includes various existing utility lines and rights-of-way (ROWs). Construction of the proposed natural gas well pads, access roads, and gas gathering pipelines has the potential for conflicts with the use or operation of those existing ROWs and utilities. However, in most cases, the project would be designed to avoid existing ROWs to the extent practical. In the case of access roads, EnCana would utilize existing road ROWs in many locations. Where existing road ROWs would be utilized, the roads would be upgraded and improved, relative to their current condition. In addition, since EnCana would maintain the roads over the life of the Figure Four Project, the roads would likely remain in better operating condition than would be the case without the project. An existing White River Electric powerline ROW is located to the east of Hunter Creek Road. This transmission line would not be impacted by installation of the Hunter Creek main gas gathering pipeline on the west side of the road. Finally, the existing Rocky Mountain Natural Gas and TransColorado Pipeline ROW corridor would be utilized by EnCana for installation of the northern portion of the main gas gathering pipeline from the proposed Lower Hunter Creek Compressor Station site to the proposed sales point 5.5 miles to the north along Piceance Creek Road. The existing disturbed pipeline corridor is sufficiently wide that the proposed main gas gathering pipeline could be installed parallel to the Rocky Mountain Natural Gas and TransColorado pipelines with sufficient distance between them that impacts to the existing pipeline would be avoided.

From a land use planning perspective, the additional natural gas development that would occur from the Proposed Action is envisioned in the White River Resource Management Plan (RMP), which cites making federal oil and gas resources available for leasing and development as one of its objectives. This development would be consistent with the RMP, assuming all applicable stipulations and Conditions of Approval designed to protect important environmental resources are adhered to by EnCana. Development of the federal natural gas resources underlying the Figure Four Unit would also be consistent with the objectives of the Mineral Leasing Act of 1920 as amended, and fulfill the leases issued by the federal government to EnCana. The Project Area lies within unincorporated areas of both

Rio Blanco and Garfield Counties. In general, both counties recognize the rights of mineral estate holders to extract resources as a matter of policy. In some cases, various county-level permitting requirements could apply to the project. As stated in Section 3.11.1, EnCana presently holds a Special Use License for its gas development activities, which would authorize the additional development envisioned by the Proposed Action. Within the Garfield County portion of the Project Area, some project facilities may be subject to conditional or special use permit requirements. Assuming EnCana was to obtain the necessary permits and authorizations from the counties, the Proposed Action would be consistent with local land use plans, policies, and objectives.

4.11.1.2 No Action Alternative

Under the No Action alternative, the proposed development of additional federal natural gas wells would not occur. Apart from existing and previously permitted federal wells, EnCana would only develop natural gas resources on four private (fee) mineral leases. In total, six well pads would be constructed and a total of approximately 18 gas wells would be drilled on those locations. These well pads would be located in Sections 7, 15, 18, and 22 of Township 4S, Range 98W.

Given the limited geographic distribution of gas wells that would be drilled under the No Action alternative, potential impacts to current land uses would be smaller in magnitude and would only affect grazing, recreation, and wildlife uses in localized areas on and near these private parcels. For utilities and other ROWs on private property, EnCana would avoid these existing features, as practical, to minimize the potential for disruption of service. Since the main gas gathering pipeline envisioned for the Proposed Action would not be built, the operation of the Rocky Mountain Natural Gas Pipeline would not be impacted.

From a land use planning perspective, the BLM's White River RMP planning objective of promoting additional development of federal natural gas resources would not be met. Since development of only private natural gas would occur on private lands, the BLM would not have jurisdiction over the development. Only the Colorado Oil and Gas Conservation Commission and the counties would have jurisdiction over development of privately owned natural gas. As stated in Section 3.11.1, EnCana presently holds a Special Use License for its gas development activities, which would authorize the additional development envisioned by the Proposed Action. Within the Garfield County portion of the Project Area, some project facilities may be subject to conditional or special use permit requirements. Assuming EnCana was to obtain the necessary permits and authorizations from the counties, where applicable, the No Action alternative would be consistent with local land use plans, policies, and objectives.

4.11.1.3 Mitigation

The following mitigation measure would be implemented to reduce impacts to land uses in the Project Area that would occur as a result of either the Proposed Action or the No Action alternative:

Where the project would affect existing ROWs held by other parties, EnCana would coordinate with the operator of the affected utility or ROW to minimize disruption of service.

4.11.2 Areas of Critical Environmental Concern

The Dudley Bluffs Area of Critical Environmental Concern (ACEC) is located on the east side of Piceance Creek Road, about 100 feet east of the proposed main gas gathering pipeline route. The Ryan Gulch ACEC is located approximately 1 mile to the west of the main gas gathering pipeline route in T2S, R97W on the west side of Piceance Creek. Since the proposed main gathering pipeline route would not cross either of these ACECs, no impacts to these areas would occur.

4.12 RECREATION

4.12.1 Proposed Action

The following impact issues have been identified for recreation:

- Construction of proposed project facilities and drilling and completion of gas wells could disrupt recreational activities in the Project Area;
- Long-term operation of the proposed project could diminish the recreational experience in the Project Area due to the presence of man-made facilities; and
- The proposed project could reduce hunting-related business for permitted outfitters who guide hunting parties in the Project Area.

As described in Section 3.12, the primary public recreational use of the Project Area is seasonal big game hunting. Most of the camping and recreational off-road vehicle (ORV) riding is associated with hunting groups using the Project Area in the fall months. In the short-term, project-related construction of well pads, access roads, and gas gathering pipelines, as well as installation of compressors and ancillary production equipment, would generate vehicle traffic, dust, noise, and increased human activity in the Project Area over the three-year construction phase of the project from about 2004 to 2006/2007. Similarly, the drilling and completion of natural gas wells would also add vehicle traffic, noise, and human activity at the well pads being drilled and along the access roads that serve them. Since hunting relies on the presence of game species and hunters generally prefer relatively quiet settings, it is likely that construction and well drilling activities would disrupt hunting in localized areas within about one mile of those activities. Both game species and hunters would likely avoid active construction areas and well drilling activities and would be displaced to other locations within and outside of the Project Area. Given the 27 square mile size of the well field area, and the fact that just 3 to 5 five drill rigs would be operating at any one time, it is likely that the vast majority of the Project Area would be relatively undisturbed for public recreational use.

Over the long-term 20 to 30 year operational life of the project, the presence of natural gas wells, production equipment and other facilities would change the character of the Project Area from generally wild to relatively industrialized, at least in areas where these facilities would be visible. This change in the character of the Project Area could diminish the

recreational experience for visitors of the Project Area near well pad and compressor locations. Since most of the project development would be on ridge top settings, it is likely hunters and other recreational users of the Project Area could find relatively undisturbed settings and campsites within the adjacent wooded drainages and valley bottoms of the Project Area or on adjacent public lands outside of the Project Area. The addition of project-related access roads, however, could increase motorized public access to portions of the Project Area and facilitate related types of public recreational use, such as camping and OHV riding. A total of 44.9 miles of new access roads would be constructed, although many of these roads would be gated and access restricted.

As described in Section 3.12, there are two permit areas used by commercial hunting guides that overlap with the Project Area. These permit areas, known as the Vaughn Ranch and LOV Ranch, generate income for the permittees who have exclusive rights to guide commercial hunting groups within their Permit boundaries (See Figure 3-13). As described previously for public visitors to the Project Area, construction of well pads, roads and gathering pipelines, and well drilling and completion in the Project Area has the potential to disrupt hunting trips in affected portions of these permit areas. In addition, over the 20 to 30 year operation life of the project, the recreational experience of guided hunting parties could be diminished by the sight of gas wells, maintained access roads, and related production facilities that would alter the semi-primitive setting of affected areas. If big game animals were displaced to locations outside of the permit areas, guided hunting parties would experience lower success rates and customers would likely choose to hunt elsewhere and do business with other outfitters as a result. This could result in substantial economic impacts and hardship on permitted guides. It is important to note, however, that only about 2.5 percent of the 16,051-acre surface area of the Vaughn Ranch permit area overlaps with the Project Area and would be potentially affected. Impacts on that permit holder are expected to be negligible as a result. On the other hand, approximately 29 percent of the 8,596-acre LOV Ranch permit area overlaps with the Project Area. Potential economic impacts to the LOV Ranch permittee could be far greater if project-related impacts are not mitigated as described in Section 4.12.3.

4.12.2 No Action Alternative

Since natural gas development activities would be limited to just a few privately-owned portions of the overall Figure Four Project Area, impacts to public recreational uses, including hunting, would be localized and smaller in scale.

4.12.3 Mitigation

To reduce the severity of impacts on permitted hunting outfitters who use the Vaughn Ranch and particularly the LOV Ranch permit areas, the following Mitigation would be implemented:

Project-related construction and well drilling and completion activities should be completed within permitted outfitter areas prior to the start of the big game hunting seasons to minimize the potential for displacement of game outside of permit areas; OR Project-related vehicle

traffic, construction activity, and well drilling and completion work would be prohibited in the early morning and later afternoon hours during big game hunting seasons in permitted outfitter areas to minimize displacement of game and disruption of hunting.

Mitigation intended to reduce visual impacts, which are described subsequently in Section 4.12.4, should be implemented to minimize negative impacts on the recreational appeal of the Project Area in general, including permitted outfitter areas.

4.13 VISUAL RESOURCES

The Proposed Action would introduce additional well pads, roads, and production facilities into an area that is generally undeveloped and natural in its appearance. The following issues related to visual impacts are addressed in this section:

- Project-related alteration of the landscape and the scenic quality of the Project Area due to grading of well pads, access roads, and gas gathering pipelines, and installation of production equipment, and
- Potential conflicts with established BLM policies and guidelines for visual resource management.

The assessment of visual impacts is based on the methodology developed in the BLM's Visual Resource Management system (BLM 1986). The degree to which the Proposed Action would impact the scenic qualities of the landscape depends on the amount of visible contrast created by project facilities in relation to the existing visual landscape character. The amount of contrast between the Proposed Action and the existing landscape character was measured by separating the landscape into its major features (landform, vegetation and structures) and analyzing the project-related changes or contrasts to each of the basic visual elements (line, form, color and texture) of those features.

Two factors were considered when examining the level of visual impact. These factors are the type and extent of actual physical contrast or alteration brought about by the Proposed Action, and the level of visibility of the disturbance to viewing areas within the Project Area. The magnitude of physical contrast is determined by looking at items such as changes in topography, vegetation patterns, color contrasts, and structural compatibility. Visibility of project components was evaluated by examining view orientation, topographic and vegetation screening, and view distance.

The severity of impacts depends on how the project may affect the existing scenic quality of the Project Area, views from travel routes including roads and trails, and views from recreational use areas.

4.13.1 Proposed Action

The Proposed Action would include the construction and long-term use of 120 well pads and related access roads that would serve them. Although the well pads were sited to take advantage of flatter ridge top terrain, their proposed 3.0-acre size would require cut and fill techniques to provide sufficient level surface. Visual contrast would occur where vegetation

removal, cut and fill slopes, and the well pad surface would change the color and texture of the landscape from a natural green/brown tone with smooth rolling texture to an earthen tone with an angular and rocky or gravelly texture. In addition, the construction of level well pads would alter the appearance of landforms. Where multiple pads would be constructed in sequence along the length of a ridge, the landform would change from gently sloping to a notched or stair-step appearance. Where pads would be constructed on round knolls or the ends of ridges, the landscape would change from rounded to notched and flattened in its appearance. Given the ridge top locations of the majority of well pads, these man-made disturbances could be visible from parallel ridges and other vantage points in and around the Project Area.

New access roads and co-located pipeline corridors would create linear features in the landscape due to the contrasting soil color, changes in vegetation patterns and possible changes in the natural topography. These changes would combine to create a very visible alteration of the landscape, often visible from long distances. This would be particularly true for roads that traverse side slopes, because cut and fill slopes would also be visible from many vantage points. Since many of the access roads would be constructed on existing road grades, the construction of access roads for the Proposed Action would simply increase an existing visual impact in many locations.

As described in Section 2.2.4, following well completion at the various pads and installation of buried pipelines, interim reclamation would be carried out on disturbed areas not required for long-term gas production. Temporarily disturbed surfaces would be recontoured and revegetated using a BLM-approved certified noxious weed-free seed mixture. Once the vegetation has reestablished, the visual contrast associated with these surfaces would be substantially reduced as their color would resemble the adjacent undisturbed surfaces. As part of the Proposed Action, a few surface pipelines would be installed on steeper terrain to reduce ground disturbance and minimize the potential for erosion. As summarized in Table 2-1, approximately 47 percent of the 901.2 acres of surface disturbance associated with construction of the Proposed Action would be reclaimed and revegetated within 1 to 3 years after construction has been completed, leaving a total of approximately 480.0 acres that would remain in an altered state for the 20 to 30 year life of the project. In total, these 480.0 acres would represent just 2.8 percent of the 17,384-acre surface area of the Project Area. Fill slopes below the well pads would likely remain visible as rock or rubble slopes over the life of the project. Since the extent of cuts and fills that would be required vary by location, the corresponding visual contrast with adjacent areas would also vary.

Natural gas production facilities such as wellheads, metering sheds, condensate tanks, and compressor stations would introduce man-made structures into the landscape that would draw attention due to their size, lines, and forms that contrast with the surrounding natural appearing landscape. However, as described in Section 2.2.7, these production facilities would be painted in a natural earth tone to blend in with the surrounding landscape. The use of natural paint tones would substantially reduce the visibility of production facilities and their visual contrast with their surroundings.

Nighttime light and glare could be generated by drill rigs during construction activities and later by production facilities and compressor stations that would attract the eye of nighttime observers present in the Project Area. In addition, well flaring immediately following drilling would generate large orange flames that would be visible over considerable distances at night. Flaring would only last 1 to 3 nights on average per well and would therefore cause only very short-term impacts. Mitigation for these project-related light sources are discussed below in Section 4.12.4.

Two important factors that are included in assessing the severity of visual impacts are the visual sensitivity of Project Area and the distance zones involved. Visual sensitivity is based on several factors including the type of observers, the amount of use an area gets, adjacent land uses, proximity to special areas (wilderness areas, scenic roads, and vistas), and visual resource management objectives of the agency with jurisdiction over the area. Landscapes are subdivided into three distance zones based on relative visibility from travel routes or observation points. Distance zones typically considered include the foreground-middle ground (0 to 5 miles) where project activities could be viewed in detail, the background (as far away as 15 miles) which can be seen from each travel route, and seldom seen areas – which are areas that are not visible within the foreground-middle ground and background zones and areas beyond the background zones (BLM 1986).

In brief, an area that is adjacent to a heavily-traveled highway, park, or residential area is considered to be more visually sensitive than a remote, sparsely used area that is seldom seen by the general public. In the case of the proposed Figure Four Project, it is important to note that, due its remote location and topographic screening, the vast majority of surface-disturbing activities and project facilities in the Project Area are in the seldom seen distance zone, and would not be visible to the general public. Specifically, the Project Area would not be visible to motorists on Piceance Creek Road (County Road 5), the only road in the region that carries a noteworthy number of vehicles and public traffic because it is located over ten miles to the south of the road and is screened by natural topography. Visual impacts over the majority of the Project Area would therefore only be visible to a few private property owners and a small number of recreational users of the area driving on primitive dirt roads within and adjacent to the Project Area. There are no parks, wilderness areas/wilderness study areas, scenic drives or vistas within close proximity of the Project Area. Since the Project Area and visual contrasts that would be generated would not be visible from major highways, parks, or populated areas, or scenic vantage points, and would only affect a small number of users of the immediate area, the visual sensitivity of the Project Area is considered to be low.

Moreover, as described in Section 3.13, the entire BLM-administered portion of the Project Area has been assigned a VRM Class III designation (BLM 1997a). According to BLM guidelines that address visual resource management, in VRM Class III areas, the objective is, "to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape" (BLM 1986).

Project-related visual contrast would be partially mitigated by revegetation of linear pipeline corridors, the painting of project-related low profile production equipment in natural tones to blend in with the surrounding landscape, and minimal night lighting using downcast visors. Since the Project Area is in a remote, seldom seen location, visual impacts to the relatively small number of observers that would be present in the area would be moderate. While various project features, such as cut and fill slopes at well pads, roads, and other production-related facilities would be visible, and these visual contrasts would attract an observer's attention, they would not dominate the view, nor contrast with the basic elements of the characteristic landscape, given the vast size of the Project Area and the considerable topographic screening that the numerous rolling ridgelines that characterize it provide. Accordingly, the Proposed Action would be consistent with the management guidelines of the BLM with respect to visual resources.

4.13.2 No Action Alternative

Under the No Action alternative, development and production of natural gas wells would only occur on approximately six private well pad locations and on the thirteen previously permitted federal well locations. As a result, impacts to visual resources would be similar to those described for the Proposed Action, but in a smaller number of locations in the Project Area.

4.13.3 Mitigation

All surface facilities would be painted a natural earth tone color selected by the BLM to reduce visual contrast, unless prohibited by OSHA regulations.

Surface gas gathering pipelines should not be painted and should be allowed to weather and blend in with the natural environment.

Night lighting of facilities would be kept to the minimum required and would use shielded downcast fixtures to reduce off-site glare. Flaring of completed wells should be carried out as quickly as possible and should be screened from distant view using berms, frac tanks or other equipment, and the natural topography to the extent practical.

4.14 TRANSPORTATION

4.14.1 Proposed Action

4.14.1.1 Construction and Well Drilling Phase

During the construction phase of the project, the level of project-related vehicle traffic would vary considerably by season and would consist of workers commuting to the various construction and well sites and trucks hauling heavy equipment, drill rigs, and supplies. The number of miles of roads in the Project Area would increase from 121 miles to approximately 166 miles.

During this period, it is estimated that construction would add an average of 86 commuter roundtrips per day from communities in the region, such as Meeker, Rifle, Silt, and Rangely. There would also be an estimated 46 roundtrip truck deliveries each day for equipment and supplies.

For traffic to the Project Area, it was assumed that about 40 percent of workers would come from either Rangely or Meeker and about 60 percent would make the daily commute from Rifle, Silt, or Parachute. As described in Section 4.14, this approximate worker distribution is based on community size and commuting distance. Using these assumptions, 40 percent of commuter traffic would reach the Project Area from Colorado State Highway 64 and the northern part of Piceance Creek Road (County Road 5) and 60 percent from Colorado State Highway 13 and the southern part of County Road 5. It is also assumed that all vendor deliveries would be made from Interstate 70, with trucks traveling north along Colorado State Highway 13 and County Road 5 to reach the Project Area.

Implementation of the Proposed Action is projected to temporarily increase traffic by about 4 percent on Colorado State Highway 13, between Rifle and County Road 5. Along Piceance Creek Road south of the Project Area, daily traffic would increase by about 30.7 percent, from approximately 261 vehicles per day to an estimated 341 vehicles per day. Traffic would increase by 2 to 4 percent along Colorado State Highway 64. North of the Project Area, traffic along the Piceance Creek Road is projected to increase by 52 vehicle-trips per day, roughly equivalent to a 19 percent traffic increase. Table 4-22 provides a summary of projected traffic increases on regional roads serving the Project Area.

Table 4-22. Summary of Projected Traffic Increases on Regional Roads Due to Project Construction

Road	Baseline Average Daily Traffic (2002)	Project Traffic, per day	Percent Increase
Colorado Highway 13 between Rifle and south end of Piceance Creek Road	1,992	80	4.0%
Piceance Creek Road (Rio Blanco County Road 5) south of Ryan Gulch	261	80	30.7%
Colorado Highway 64 between Rangely and north end of Piceance Creek Road	722	26	3.6%
Colorado Highway 64 between Meeker and north end of Piceance Creek Road	1,479	26	1.8%
Piceance Creek Road (Rio Blanco County Road 5) north of Ryan Gulch	274	52	19.0%

Virtually all vehicle traffic entering and leaving the Project Area would either utilize County Road 69 or Hunter Creek Road, depending on which portion of the well field they intend to access. Another important road that would be heavily utilized by vehicle traffic would be the main ridge top road that traverses the south side of the well field in an east-west direction. After entering the Project Area from either County Road 69 or Hunter Creek Road, vehicles would access wells on the various north-south trending ridgelines using this main ridge top road. The distribution of vehicle trips during the construction and well drilling and

completion phase of the project would vary over time as vehicle trips would be concentrated in areas where work was taking place. Figure 2-6 provides a map of proposed roads within the Figure Four well field area that would be utilized by the Proposed Action.

Accident data are reported in terms of numbers of accidents per roadway section or by average mile within a particular section, and by the accident rate (the number of accidents per million miles of vehicle travel on a particular roadway). The actual number of accidents on the two Colorado State Highways within the study area (SH 13 and SH 64) is reported by the Colorado Department of Transportation (CDOT) for a 5-year period from 1993 through 1997. On this section of SH 13 (19 miles), a total of 83 accidents were reported, including two fatalities and 35 injuries. On SH 64 (17.5 miles), a total of 48 accidents were reported, with no fatalities and 29 injuries.

These data can best be understood in terms of the accident rate. The statewide average accident rate for rural state highways is approximately 1.22 accidents per million miles of travel (CDOT 1994). The construction phase of the Proposed Action would generate approximately 5,769 miles of traffic daily within the Project Area. Assuming the Colorado accident rate for rural highways (1.22 accidents/million miles), an additional 1.9 accidents per year would be expected as a result of the Proposed Action.

4.14.1.2 Operating Phase

Over the 20 to 30 year operating life of the Proposed Action, vehicle traffic to the Project Area would drop to lower levels after construction and well drilling was concluded. It is estimated that vehicle traffic to the Project Area would include about 20 total trips per day. These trips would include 11 truck trips associated with condensate hauling, five trips associated with produced water hauling from the Hunter Creek Valley one large truck trip per day associated with deliveries of equipment and parts, and periodic well workovers, and three daily commuter round-trips associated with maintenance crews in pickup trucks. These vehicle trips would have a small impact on traffic volumes and accident rates on roads that serve the Project Area. Routine maintenance-related vehicle trips and condensate haul traffic would be evenly distributed over the entire well field area as well inspections and maintenance and condensate hauling would occur on a regularly scheduled basis over the life of the project.

4.14.2 No Action Alternative

Under the No Action alternative, only modest volumes of traffic would be generated to construct, drill, and operate the limited number of wells that would be developed on private leases and the previously permitted federal wells. This drilling activity would likely be completed with 2 to 3 years and after that, traffic associated with production would be negligible on Piceance Creek Road and roads serving the wells that would be developed.

4.14.3 Mitigation

Since EnCana would construct and maintain the local roads they would utilize in the Project Area, and given the traffic impacts the Proposed Action and the No Action alternative would

have on the regional transportation network, no additional Mitigation for transportation are required

4.15 SOCIOECONOMICS

4.15.1 Proposed Action

4.15.1.1 Demographics

The Proposed Action would hire local area residents from Rio Blanco and Garfield Counties almost entirely to staff the Figure Four Project. Both counties have a long history of oil and gas-related activity and a sufficient pool of qualified workers are available to staff the project. For some of the construction and drilling activities, specialized contractors would be used. These workers would temporarily reside in regional communities such as Meeker, Rangely, and Rifle in motel rooms and RV parks. As a result, little or no impact to the local area population is anticipated.

4.15.1.2 Local Economy and Employment

Approximately 175 workers would be needed to construct the proposed well pads, access roads, and gas gathering pipelines and drill and complete the proposed natural gas wells. Since the local workforces in Rio Blanco and Garfield Counties have had previous experience with oil and gas development and many qualified workers reside in those counties, it is likely EnCana would hire the vast majority of its workers and utilize contractors from local communities such as Rangely, Rifle, and Meeker. Certain specialized positions could be temporarily filled by workers from outside of the local area. Those workers would likely utilize local motels for lodging and restaurants for meals. As a result, the Proposed Action would increase local area employment, and spending activity at local businesses which would generate positive impacts for local communities.

Long-term employment would be created for local well service contractors for on-going operation and maintenance of wells during production. It is estimated that approximately 20 long-term jobs would be created, which would be a positive, although smaller impact on the communities in the region.

The purchase of materials, supplies, and local services would also have a short-term positive effect on the local economy, as it would stimulate additional employment and generate additional sales and use tax revenue for Garfield and Rio Blanco Counties.

However, on a localized level, the permitted outfitters who utilize the Project Area for their livelihoods (at least in part), could experience negative economic impacts if the businesses suffer from displacement of big game animals from their permit areas due to project-related noise, traffic, and human activity. In addition, the presence of natural gas production equipment and ground disturbance could reduce the appeal of the permit areas for hunting and the outfitters could experience a loss of clientele as a result.

4.15.1.3 Community Emergency Response Services

The proposed project could increase the demand on community facilities and local government services in Rio Blanco and Garfield Counties should emergencies occur requiring medical, fire, or law enforcement assistance. The increased demand for fire response services could be mitigated as described in Section 4.14.4, but the increased demand for law enforcement and medical response cannot. However, increase tax revenue that would be generated by the Proposed Action would more than offset the potential increase in these costs. Given the infrequent nature of law enforcement incidents and injury accidents, the increase in demand for these services is considered to be insignificant.

4.15.1.4 Local Government Fiscal Conditions and Revenues from Natural Gas Activities

Taxes and royalties from gas production would provide a source of income to local, state and federal governments. Rio Blanco and Garfield Counties would collect ad valorem taxes from the value of gas production and surface facilities. The purchase of materials and supplies used for construction and drilling, pipeline placement, and road improvements would generate state and local sales and use tax revenue. State severance tax also is paid on gross revenues from gas production. Federal mineral royalties of 12.5% would be paid on each producing gas well, a portion (50%) of which would be distributed to the State of Colorado and the counties. The taxes and royalties generated by the project depend on the success and production of the proposed wells, which cannot be determined until the wells are drilled.

4.15.2 No Action Alternative

With the limited number of natural gas wells that would be drilled under the No Action alternative, potential impacts to socioeconomic factors would be much smaller than would be the case under the Proposed Action. While the drilling of wells on private gas leases would benefit the local economy from the creation of additional jobs, spending by contractors at local businesses and *ad valorem* and other tax and royalty revenue would increase relative to the present situation, these positive socioeconomic impacts would be considerably smaller.

4.15.3 Mitigation

The following Mitigation are proposed for socioeconomics:

- To reduce potential negative impacts on the business of permitted outfitters, the BLM would modify the permit boundaries to permit guided hunts in additional areas outside of the Project Area.

- To minimize the potential for wildfires and the demand for local fire protection services during construction and operation, all equipment, including welding trucks, would be equipped with fire extinguishers and other fire suppression equipment as recommended by the BLM.

4.16 UNAVOIDABLE ADVERSE IMPACTS

Air Quality – Air quality impacts would occur during the construction and operation of the Proposed Action or the No Action alternative on a smaller scale, even with implementation of Mitigation to reduce impacts, such as fugitive dust control on roads and use of low emission compressor engines. However, pollutant concentration levels would return to background conditions at the end of the project life.

Vegetation and Wildlife – vegetation/wildlife habitat and forage would be lost at least temporarily until revegetation success is achieved for all areas of project disturbance.

Visual Resources – Even after Mitigation would be implemented, some residual visual impacts would be unavoidable in the Project Area due to ground disturbance, topographic changes and the installation of man-made facilities. These residual visual contrasts would represent an unavoidable adverse impact to visual resources in the area, even though the planning objectives of the BLM with respect to visual resources would still be met.

4.17 SHORT-TERM VERSUS LONG-TERM PRODUCTIVITY

CEQ regulations specify that the description of impacts should identify how short-term uses of the environment would affect long-term productivity of resources. During the life of the project, the construction phase would represent the period of greatest short-term effect to the physical environment. The short-term and long-term effects relative to each resource were described in Chapter 4.

4.18 IRREVERSIBLE OR IRRETRIEVABLE COMMITMENT OF RESOURCES

The development and operation of the Figure Four Project would involve irreversible and irretrievable commitment of various resources that are either consumed, committed or lost during the life of the project. Irreversible commitment of resources would occur if processes (chemical, biological, or physical) related to the project could not be stopped, and the resource or its productivity or utility is forever consumed or committed. Irretrievable commitment of resources would result from resources used, consumed destroyed or degraded during construction, operation, and abandonment of the project and could not ever be retrieved or replaced. The irreversible and irretrievable commitment of resources of the Figure Four Project include the following:

- Geology - Removal of natural gas resources
- Soil - Loss of soil due to accelerated erosion; loss of soil profile development and soil productivity
- Cultural and Paleontological Resources - Loss of nonrenewable resources due to accidental disturbance or mitigation activities
- Visual - Degradation of natural scenic quality due to potential permanent changes in topography and vegetation patterns
- Construction Materials - Use of aggregate, water, steel, concrete and fossil fuels.

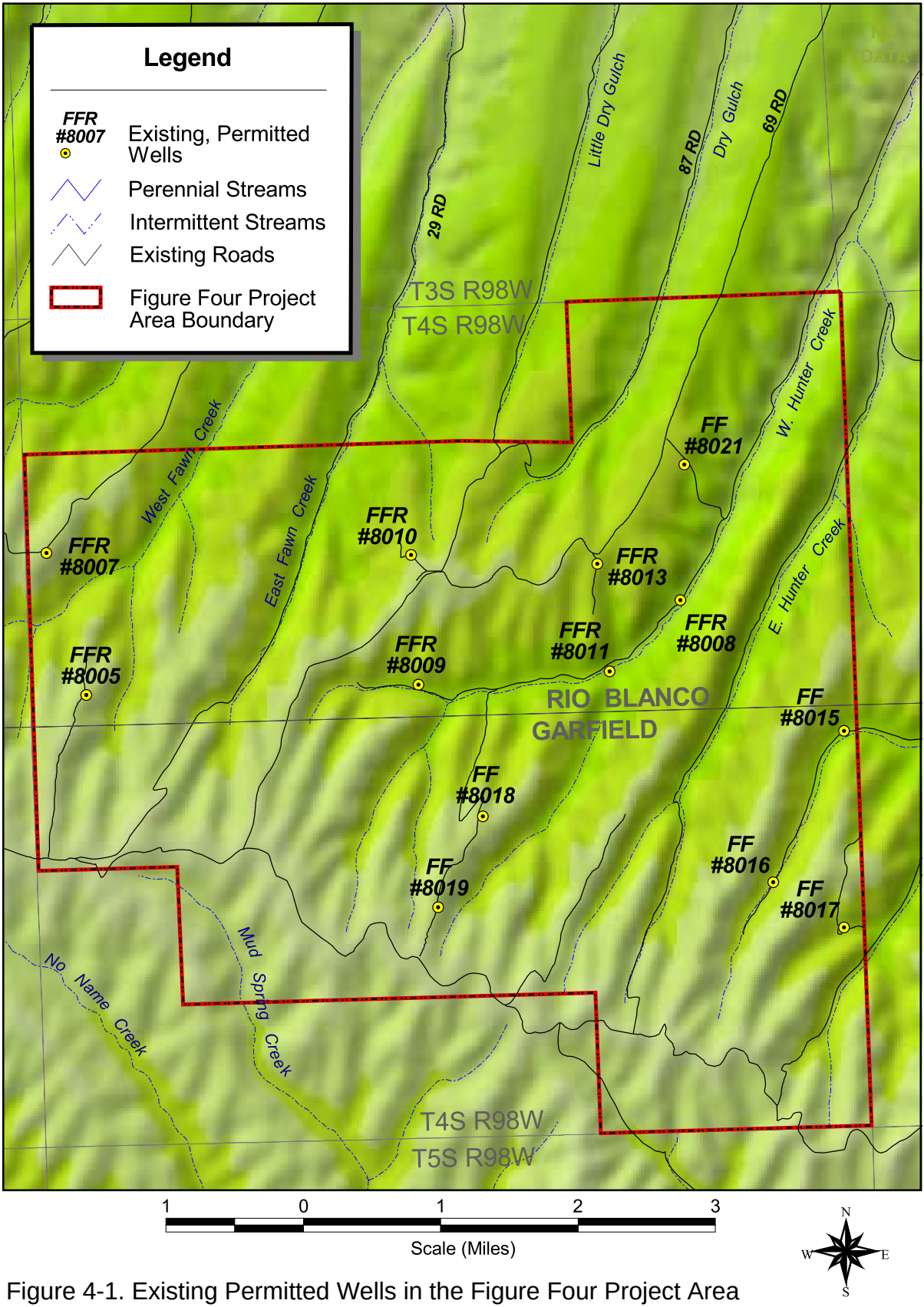

Figure 4-1. Existing Permitted Wells in the Figure Four Project Area

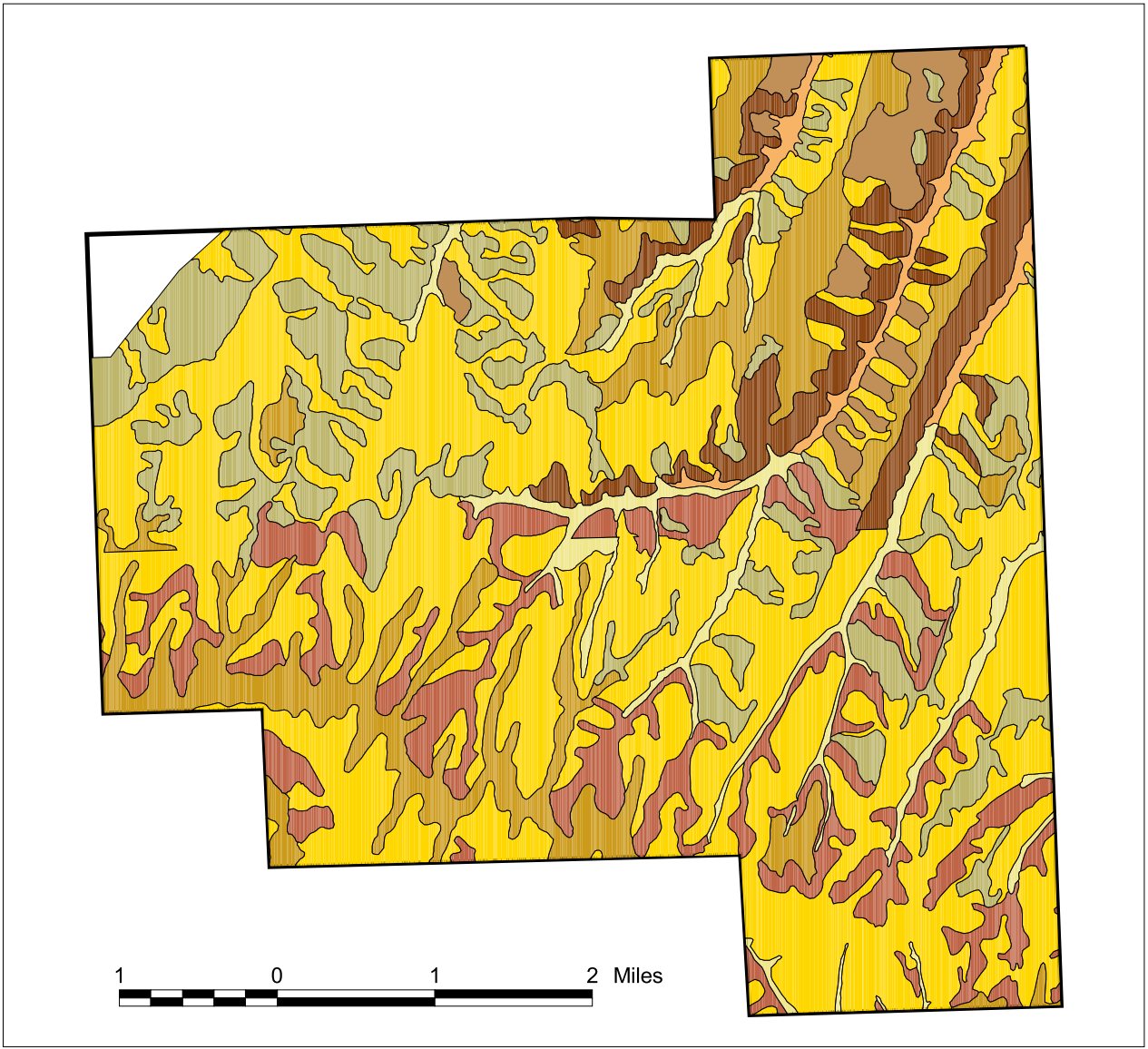

Figure 4-2. Ecological Range Sites in the Project Area

5.0 CUMULATIVE IMPACTS

Compliance with NEPA requires analysis of the cumulative impacts of the Proposed Action and alternatives. Cumulative impacts are those resulting from the incremental impact of an alternative when added to other past, present, and reasonably foreseeable future actions, regardless of who has taken those actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

The geographic context of cumulative impacts varies by natural resource. For example, air quality and or socioeconomic cumulative impacts may affect an entire region downwind, or a multi-county area, or may just occur within a specific wildlife habitat, elk game management unit, or watershed. Unless specifically stated otherwise in resource-specific sections below, the Cumulative Impact Assessment Area (CIAA) for resource analyses within this EA includes the Fawn, Dry Gulch, Hunter, and Willow Creek watersheds. The CIAA encompasses the Project Area, adjacent BLM lands, and private properties. Several reasonably foreseeable future activities could potentially occur within the CIAA over the life of the Figure Four Natural Gas Project.

With implementation of the Proposed Action, EnCana would assess the productivity and economic viability of the natural gas resource in the Figure Four Unit as a whole. If EnCana identifies a promising gas resource, it is reasonably foreseeable that the company would seek to efficiently develop and drain the entire economically viable natural gas resource from the well field. To accomplish this goal, EnCana would likely drill additional wells above and beyond the 327 that would be drilled under the Proposed Action and are analyzed in this document. Until many of the proposed gas wells are drilled and the quality and geologic extent of the natural gas resource is better understood, the number of reasonably foreseeable additional gas wells is unknown.

Drilling, completion, and production of natural gas from additional wells under this future development scenario would result in an extension of drilling activity above and beyond the timeframe described for the Proposed Action. In addition, EnCana would install additional gas metering, separation, dehydration, tanks and other ancillary facilities and increase the amount of compression to serve the additional gas production on the Figure Four Unit. However, since EnCana would utilize the well pads, roads, and pipelines already constructed under the Proposed Action, very little additional ground disturbance would be required to develop the foreseeable future development scenario. Given the timeframe that would be required to develop the Proposed Action, uncertainties associated with the size and viability of the gas resource, and uncertainty with respect to future gas prices and project economics, it is unlikely the foreseeable future development scenario would be pursued by EnCana until many years in the future, if ever. Should additional wells be proposed by EnCana in the future, an amended GAP would be filed with BLM and another NEPA document would be prepared as required to analyze the potential environmental effects of such development.

Additional natural gas drilling and production outside of the Figure Four Unit is anticipated on federal lands and private locations in the CIAA over the next several years, although specific numbers of wells and related surface disturbance have not been identified. Other

reasonably foreseeable BLM management activities and/or private activities that would continue include livestock grazing, road improvements, and recreational activities. No timber sales are expected to occur on BLM lands within the CIAA over the next 5 years. Residential development activities on private lands within the CIAA are expected to be minimal over the next 3 to 5 years. Livestock grazing is likely to continue at existing levels on private lands. Each of the activities discussed above, when added to past and present land uses in the CIAA, has the potential to result in positive and/or negative cumulative impacts on environmental resources.

The cumulative impacts of the Proposed Action and other reasonably foreseeable future actions are discussed in the following sections.

5.1 GEOLOGY AND MINERAL RESOURCES

The reasonably foreseeable development for the Project Area would include additional natural gas wells. However, all additional wells would be drilled from the 120 well pads developed for the Proposed Action. Therefore, no additional disturbances to the topography of the area would occur. Oil and gas projects may also be proposed for other areas of the Piceance Basin. These projects could lead to additional modifications of the local topography.

In addition to the natural gas wells, it is reasonably foreseeable that development of oil shale resources will occur at some point in the future. Development of oil shale resources could lead to large-scale changes to the topography of the area, if open-pit mining techniques were used. The majority of the oil shale resources are located to the north of the Project Area in the depositional center of the Piceance Basin. It is expected that these areas would be mined first. Additional development of sodium resources may also occur to the north of the Project Area. Depending on the mining techniques used, potential cumulative changes to the local topography could include the construction of additional well pads for in-situ mining of sodium, and the development of spent rock waste dumps associated with the mining of oil shale.

5.1.1 Mineral Resources

5.1.1.1 Natural Gas

The reasonably foreseeable development for the area includes additional natural gas wells. Under this scenario, all economically viable natural gas resources would be extracted from the Project Area, including areas that would not be drained by the Proposed Action. Other oil and gas development outside of the Project Area would deplete natural gas resources from affected locations.

5.1.1.2 Oil Shale

The reasonably foreseeable development for the Project Area includes additional natural gas wells drilled from the existing well pads. Because the additional wells would be drilled using directional drilling techniques, the entire Project Area may become unavailable for extraction of oil shale resources using conventional mining techniques. The Project Area covers approximately 17,385 acres, or about 3.1% of the 900 square miles (558,000 acres) considered to be the Piceance Creek structural basin (Weeks et al, 1974). If it is assumed that the oil shale resource is consistent across the basin, then the full development of the Project Area could possibly preclude mining of 3.1% of the total oil shale resource because of physical obstructions represented by the well casings. However, as noted above, the majority of the oil shale resources are located to the north of the Project Area in the depositional center of the Piceance Basin.

5.1.1.3 Sodium

Additional oil and gas projects are expected to be proposed for other areas of the Piceance Basin. Some of these areas could coincide with the areas underlain by significant sodium resources. Therefore, some sodium resources may be precluded from mining, if additional oil and gas projects are implemented.

5.1.1.4 Salable Minerals

The reasonably foreseeable development for the Project Area includes additional natural gas wells drilled from the existing well pads. Because the additional wells would be drilled using directional drilling techniques, impacts to salable mineral resources would be the same as for the Proposed Action. Additional oil and gas development outside the Project Area, oil-shale resource development, and extraction of sodium would all use additional sand and gravel for construction.

5.1.1.5 Other Reasonable Foreseeable Activities

Other reasonably foreseeable future activities that could also result in impacts to mineral resources include private activities, such as livestock grazing and road improvements, and recreational activities. Although some residential development is likely to occur it is expected to minimal over the next 3-5 years. Quantified data on these other land uses are not available at this time. However, some level of these other activities are reasonably certain to occur. Therefore, they will cumulatively add to the impacts of the Proposed Action and other mineral activities on mineral resources.

5.2 PALEONTOLOGY

The reasonably foreseeable development for the Project Area includes additional natural gas wells. However, all additional wells would be drilled from the well pads developed for the Proposed Action. Therefore, no additional disturbances to paleontological resources would occur.

Development of oil shale resources could lead to impacts to paleontological resources of the area, particularly if open-pit mining techniques were used. The majority of the oil shale resources are located to the north of the Project Area in the depositional center of the Piceance Basin. It is expected that these areas would be mined first. Additional development of sodium resources may also occur to the north of the Project Area. Depending on the mining techniques used, impacts to paleontological resources could occur due to the construction of additional well pads for in-situ mining of sodium.

Other reasonably foreseeable future activities that could also result in impacts to paleontological resources include private activities, such as livestock grazing and road improvements, and recreational activities. Although some residential development is likely to occur it is expected to minimal over the next 3-5 years. Quantified data on these other land uses are not available at this time. However, some level of these other activities are reasonably certain to occur. Therefore, they will cumulatively add to the impacts of the Proposed Action and other mineral activities on paleontological resources.

5.3 SOILS

Additional impacts to soil resources may occur within the CIAA due to other oil and gas projects, mining of oil shale, and mining of sodium. Each of these types of projects is expected to be proposed at some point in the future.

The reasonably foreseeable development for the Project Area includes additional natural gas wells. However, all additional wells would be drilled from the 120 well pads developed for the Proposed Action. Therefore, additional impacts to soils would be minimal. Oil and gas extraction projects may also be proposed for other areas of the Piceance Basin outside of the Project Area. Construction of access roads, pipelines, and well pads for these oil and gas projects would increase the acreage of soils that would be disturbed in the region. The increased area of disturbed soils could increase the amount of short-term sedimentation to water courses and ponds, including Piceance Creek, if applicable surface stipulations and Condition of Approvals (COAs) are not properly implemented.

In addition to the natural gas wells, it is reasonably foreseeable that development of oil shale resources will occur at some point in the future. Development of oil shale resources could lead to significant impacts to soils of the area. Greater or lesser impacts to soils would occur depending on if open-pit, underground, or in-situ mining techniques were used, and the extent that applicable surface stipulations and COAs are implemented.

Additional development of sodium resources may also occur to the north of the Project Area. Depending on the mining techniques used, additional impacts to soils within the Piceance Basin could occur due to the construction of additional well pads and associated facilities for in-situ mining of sodium. However, implementation of surface stipulations and COAs would limit impacts to soils.

Other reasonably foreseeable future activities that could also result in impacts to soil resources include private activities, such as livestock grazing and road improvements, and recreational activities. Although some residential development is likely to occur it is

expected to minimal over the next 3-5 years. Quantified data on these other land uses are not available at this time. However, some level of these other activities are reasonably certain to occur. Therefore, they will cumulatively add to the impacts of the Proposed Action and other mineral activities on soil resources.

5.4 SURFACE WATER

Additional impacts to surface water resources may occur within the CIAA due to other oil and gas projects, mining of oil shale, and mining of sodium. Each of these types of projects is expected to be proposed at some point in the future.

The reasonably foreseeable development for the Project Area includes additional natural gas wells. However, all additional wells would be drilled from the well pads developed for the Proposed Action. Therefore, additional short-term impacts to surface water quality would be negligible. Oil and gas extraction projects may also be proposed for other areas of the Piceance Basin outside of the Project Area. Construction of access roads, pipelines, and well pads for these oil and gas projects would increase the acreage of soils that are disturbed in the region. The increased area of disturbed soils would likely increase the amount of short-term sedimentation to water courses and ponds, including Piceance Creek.

Development of oil shale resources could lead to additional short-term impacts to surface water resources of the Piceance Basin. Greater or lesser impacts to surface water resources would occur depending on if open-pit, underground, or in-situ mining techniques were used and the effectiveness of surface stipulations, COAs, and other Mitigation intended to reduce surface water impacts.

Additional development of sodium resources may also occur to the north of the Project Area. Depending on the mining techniques used, additional short-term impacts to surface water resources within the Piceance Basin could occur due to sedimentation associated with the construction of additional well pads for in-situ mining of sodium.

Other reasonably foreseeable future activities that could also result in impacts to surface water include private activities, such as livestock grazing and road improvements, and recreational activities. Although some residential development is likely to occur it is expected to minimal over the next 3-5 years. Quantified data on these other land uses are not available at this time. However, some level of these other activities are reasonably certain to occur. Therefore, they will cumulatively add to the impacts of the Proposed Action and other mineral activities on surface water.

Long-term impacts to surface water resources from any of the reasonably foreseeable developments would be negligible.

5.5 GROUNDWATER

Additional potential impacts to groundwater resources may occur within the CIAA due to other oil and gas projects, mining of oil shale, and mining of sodium. Each of these types of projects is expected to be proposed at some point in the future.

The reasonably foreseeable development scenario for the Project Area includes additional natural gas wells. However, all additional wells would be drilled from the well pads developed for the Proposed Action. Oil and gas extraction projects may also be proposed for other parts of the Piceance Basin outside of the Project Area. The additional wellheads and liquid storage tanks would increase the potential for contamination of alluvial aquifers by petroleum due to spills from project facilities. The additional wells would have minor potential impacts on the Upper and Lower Aquifers, assuming proper well drilling completion, and casing procedures are followed.

In addition to the natural gas wells, it is reasonably foreseeable that development of oil shale resources will occur at some point in the future. Development of oil shale resources could lead to potential impacts to groundwater resources of the Piceance Basin. The richest oil-shale resource is located in the Mahogany Zone, which lies between the Upper and Lower Aquifers. Mining of this resource could lead to increased dissolved solids concentrations within the Upper Aquifer.

Additional development of sodium resources may also occur to the north of the Project Area. Potential impacts to groundwater resources within the Piceance Basin could occur due to increased amounts of dissolved solids in the Upper and Lower Aquifers caused by in-situ mining of sodium, should COAs related to proper casing of wells and isolation of aquifers prove ineffective.

Other reasonably foreseeable future activities that could also result in impacts to groundwater resources include private activities, such as livestock grazing and road improvements, and recreational activities. Although some residential development is likely to occur it is expected to minimal over the next 3-5 years. Quantified data on these other land uses are not available at this time. However, some level of these other activities are reasonably certain to occur. Therefore, they will cumulatively add to the impacts of the Proposed Action and other mineral activities on groundwater resources.

5.6 AIR QUALITY AND CLIMATE

5.6.1 Near-Field

Cumulative sources within 50 kilometers of the Project Area were included in the near-field air quality analysis. These sources were identical to the ones being evaluated for the planned Glenwood Springs Resource Management Plan air quality impact assessment. Two source groups were considered. The first group was sources that had been identified or permitted but were not yet in operation during the year that the background conditions were established. The second group of sources consisted of potential additional compressor stations that may be installed if gas development proceeds on the Roan Plateau. The total of these sources within 50 kilometers of the Figure Four Unit was 7,653 tons per year of NO_x. PM_{10} and CO emissions are on a similar scale. The locations and emissions of these sources are shown in Appendix F.

The incremental cumulative effect of Figure Four Unit sources in addition to the other sources is very small, as shown in Table 5-1.

Table 5-1. Proposed Action vs. Cumulative Impact Comparison

Pollutant	Averaging Time	Project Maximum Predicted Impact ($\mu g/m^3$)	Project plus Cumulative Sources Maximum Predicted Impact ($\mu g/m^3$)	Incremental Increase of Cumulative Sources
NO_2	Annual	18.4	19.4	5.4%
CO	1-hour	1267.8	1268.2	0.03%
	8-hour	937.3	937.3	0
PM_{10}	Annual	18.713	18.717	0.02%
	24-hour	66.92	66.97	0.07%

5.6.2 Far-Field

The BLM is currently conducting a far-field cumulative air quality impact assessment for the Roan Plateau RMP Amendment DEIS, which will include potential impacts from this Proposed Action. Until that cumulative assessment is complete, quantitative analysis results are not available. However, given the relatively small air pollutant emissions associated with the Proposed Action compared to all other emission sources in the cumulative analysis area, it is likely that the relative contribution to overall cumulative impacts from the Proposed Action would also be proportionately small. Cumulative contributions from the No Action alternative would be even less.

5.7 NOISE

Since noise impacts during both the short-term and long-term timeframes would affect isolated locations within close proximity to noise sources, such as drill rigs and compressor stations, no cumulative noise impacts are expected as other projects in the region would only affect their own site-specific locations.

5.8 VEGETATION AND RANGELAND RESOURCES

5.8.1 Special Status Plant Species

Assuming other BLM-authorized actions in the WRRA comply with applicable surface stipulations and COAs, no consequential cumulative impacts would occur to plant species of concern or their habitat within the analysis area upon implementation of the proposed Mitigation.

5.8.2 Noxious Weeds

The Proposed Action, plus other oil and gas, mining, oil shale, and other projects outside of the Project Area could cumulatively increase the spread of noxious weed infestations in the region, but these projects would be subject to BLM and other legal requirements related to weed control.

5.8.3 Rangeland Resources and Grazing

Past land management practices and activities that have affected rangeland resources in the CIAA include livestock grazing, road construction and maintenance, and the construction of oil and gas wellsites and pipelines, mining, and oil shale projects. Surface disturbance and loss of vegetation associated with implementation of the Proposed Action would increase the cumulative loss of range resources. However, the incremental increase in short-term impacts over existing impacts would be small. Following reclamation, the incremental long-term loss of rangeland would be reduced. Furthermore, the cumulative loss of rangeland resources would be further diminished over time as natural gas projects would eventually be closed and reclaimed after the gas resource is depleted. Given the actions and measures proposed by EnCana, cumulative permanent loss of forage due to disturbance or invasion by noxious weeds is expected to be minimal.

5.8.4 Wetlands and Riparian Areas

Any unpermitted impact to wetlands and riparian areas associated with this project or other past, present, or future projects in the vicinity or region would add to the cumulative loss of those important resources. The historical loss of wetlands in the U.S. has been well documented as a major environmental problem. The majority of wetland and associated riparian vegetation loss is traditionally associated with agricultural conversion. Assuming other BLM-authorized projects would obtain COE-approved Section 404 permits for applicable future projects in the region, those projects would be required to avoid or mitigate impacts to wetlands and riparian vegetation. Compliance of these other projects in the CIAA with COE permitting requirements would minimize cumulative impacts to wetlands and riparian vegetation.

5.9 WILDLIFE RESOURCES

5.9.1 General Wildlife

The ~~(~~CIAA~~)~~ for wildlife includes the White River Field Office Area and its associated watersheds. Under the Proposed Action, the long-term loss of 743.1 acres of pinyon-juniper woodland, mountain shrub, sagebrush steppe and aspen woodland habitat would have a relatively minor impact on wildlife species in the Project Area given the extent of similar habitats within the greater White River Field Office area. Any displacement of wildlife from habitats due to construction and drilling activities would be short-term and site-specific. Direct mortality of wildlife would likely be limited to small numbers of small mammals or birds. Therefore, these impacts are not likely to adversely affect wildlife species on a population-level basis. However, in the context of cumulative impacts, the proposed reduction of vegetation and the potential for displacement and/or direct mortality of wildlife represents an incremental, cumulative impact on wildlife resources within the field office area when added to other past, present and future land use activities that have resulted in similar disturbances.

5.9.1.1 Big Game

Elk and mule deer summer ranges are considered critical habitat because of their limited extend throughout the White River Field Office area. Although these ranges would be directly affected by construction related activities in the Project Area, the Proposed Action would not cause overall surface disturbances in the field office area to exceed the 10% RMP objective (BLM 1997a). As additional projects are developed within the CIAA, big game ranges would continue to be diminished. If future projects would exceed the 10% limitations discussed in the RMP, development activities would be altered. In addition, increased roads and access to remote areas would increase pressures from hunting, poaching, and vehicle collisions and would disperse big game from otherwise suitable habitats.

5.9.1.2 Waterfowl and Upland Game

The majority of waterfowl and upland game birds found in the Piceance Creek Basin are widely distributed and are found throughout most of Colorado. Despite this characteristic, continued development in the CIAA would continue to degrade waterfowl and upland game habitat. As existing water sources are valuable to these species, future development could deter waterfowl and upland game from using these resources, which could alter migration patterns. In addition, future oil and gas development could expose these species to contaminated water through exposure to evaporation ponds.

5.9.1.3 Raptors

A variety of raptors inhabit the CIAA and make use of all habitats present. The possible negative cumulative impacts of development activities to raptor species across the Piceance Basin would include an increased loss of foraging habitat, increased potential for vehicle collisions, human harassment, and the potential loss of nesting habitat. Since development activities commonly include stipulations regarding raptor nesting habitat, this impact would be relatively minor.

5.9.1.4 Fisheries

For fishery resources, water needed for gas drilling would incrementally add to Colorado River depletions that have occurred/will occur for past, present and future projects requiring water in the Piceance Creek watershed. Negative cumulative impacts primarily would consist of the minor, but incremental, increase in erosion and sediment yield that could occur due to surface disturbance associated with construction of the proposed well pads, access roads, and pipelines. These impacts would incrementally add to water quality effects (and therefore, fishery effects) of other past, present and future land use projects within the CIAA.

5.9.1.5 Migratory Birds

As future development occurs within the CIAA, migratory bird habitat would continue to be lost. The primary effects of these losses would be degradation of nesting habitat as well as disturbance during the nesting season. If disturbances occur during this season, nests have the potential to be destroyed or abandoned, therefore altering bird populations across the

area. In addition, noise and human activity in areas previously void of disturbance could cause migratory patterns to be altered.

5.9.2 Special Status Wildlife Species

5.9.2.1 Bald Eagle

Cumulative impacts related to development in the CIAA would affect bald eagles through losses in roosting and foraging habitat. These affects would be relatively minor considering the magnitude of these habitats across the CIAA. As no nesting habitat occurs in the CIAA, bald eagle recruitment would not likely be altered.

5.9.2.2 Greater Sage-Grouse

Greater sage-grouse ranges and habitat occur throughout most of the CIAA, and is considered critical habitat under the White River Field Office area RMP (BLM 1997a). Development in this area would continue to degrade and fragment these ranges as well as eliminate potential nesting, brooding and lek habitat. Increased road development and human activity in previously remote areas could further reduce sage-grouse habitat through displacement from otherwise suitable habitat. As roads are increased so would the overall access to these areas, therefore increasing potential for poaching and vehicle collisions. As these cumulative affects would degrade current habitat as well as potential future habitat, population growth potential in the CIAA would be severely limited. If future development activities in the CIAA would reduce sage-grouse critical habitat to >10%, development activities would be prohibited.

5.9.2.3 Endangered Colorado River Fish

Implementation of the Proposed Action would result in negative cumulative impacts on the Endangered Colorado River Fish species. Negative cumulative impacts primarily would consist of the minor, but incremental, increase in erosion and sediment yield that could occur due to surface disturbance associated with construction of the proposed well pad, access road, and pipeline. These impacts would incrementally add to water quality effects (and therefore, fishery effects) of other past, present and future land use projects within the CIAA. In addition, water needed for drilling would incrementally add to Colorado River depletions that have occurred/will occur for past, present and future projects requiring water in the Piceance Creek watershed.

5.10 CULTURAL RESOURCES

Since only one potentially significant cultural resource site has been identified in the Project Area and this site would either be avoided completely, or impacts to it would be mitigated through implementation of an approved Treatment Plan.

Disturbance and/or loss of unidentified cultural sites could add to the cumulative loss of information about our heritage in the BLM White River Field Office area and throughout the region if these resources are not properly identified, inventoried, and/or appropriately

protected prior to disturbance. However, such losses are not expected since Mitigation as identified in Section 4.11.3 would be implemented under all proposed and potential future regional projects.

5.11 LAND USE AND AREAS OF CRITICAL ENVIRONMENTAL CONCERN

5.11.1 Land Use

For land use, the cumulative impact assessment area (CIAA) is the Piceance Creek watershed. Under the Proposed Action, the displacement of livestock grazing, recreation, and wildlife uses in the Project Area would be temporary in nature in most locations. In the context of cumulative impacts, this displacement of land uses represents an incremental, cumulative impact on those land uses when added to other past, present and future land use activities that have resulted in similar effects in the Piceance Creek watershed. Under the No Action alternative, the potential for additional displacement of grazing, recreation, and wildlife land uses due to modest levels of additional oil and gas activity on private property and other similar projects in the region would also incrementally add to the cumulative displacement of these land uses within the CIAA, although to a lesser degree.

5.11.2 Areas of Critical Environmental Concern

Since neither the Proposed Action nor the No Action alternative would impact ~~(~~ACECs~~)~~ within the Project Area, no cumulative impacts to ACECs would occur as a result of the Figure Four Project.

5.12 RECREATION

Given the importance of hunting as the predominant recreational activity in this portion of the White River Field Office area, the cumulative impact assessment area (CIAA) for recreation is Game Management Unit 22. Under the Proposed Action, the displacement of big game and disruption of hunting activities would be localized and temporary in nature in most locations. In the context of cumulative impacts, this displacement of hunting and other recreational uses from affected areas represents an incremental, cumulative impact on those uses when added to other past, present and future land use activities that have resulted in similar effects on recreation in the CIAA. The cumulative impact to recreational experiences dependent on Semi-Primitive Motorized areas would be adverse for recreational visitors to the CIAA. This cumulative impact would persist until natural gas projects in the region reach the end of their productive lives and the affected areas are restored to their previous semi-primitive condition.

Under the No Action alternative, the potential for additional displacement of recreational activities due to modest levels of additional oil and gas activity on private property, combined with other similar projects in the region, would also incrementally add to the cumulative loss of recreational uses dependent on semi-primitive settings within the CIAA.

5.13 VISUAL RESOURCES

For visual resources, the CIAA includes the Piceance Creek Valley and surrounding ridgelines. Various development activities, including other oil and gas development projects, sodium mining operations, and pipeline projects from the past, present, and in the foreseeable future would all cumulatively add to man-made alterations of the landscape, which cumulatively would moderately the scenic quality of the CIAA, particularly where visible from Piceance Creek Road. However, given the relatively low visual sensitivity of the CIAA and the Class III rating given the area by the BLM, these cumulative impacts to visual resources would be consistent with BLM planning objectives, particularly if Mitigation is implemented to reduce the degree of visual impacts. Given the topography and vast size of the CIAA, many of these projects, including the Proposed Action and the No Action alternative, would be located in the seldom seen distance zone and/or screened from view from Piceance Creek Road, where the majority of public observation takes place.

5.14 TRANSPORTATION

For transportation, the CIAA includes the Piceance Creek Road and the associated local road network in the Piceance Creek Valley. Because past, present, and reasonably foreseeable future development in the Project Area would be geographically dispersed, cumulative level of service (LOS) traffic effects would generally be minor. Given the relatively low traffic volumes experienced on roads in this region, the addition of traffic under the Proposed Action or No Action alternative, combined with other projects in the region is expected to have only minor impacts on the transportation network in the CIAA.

5.15 SOCIOECONOMICS

The CIAA for socioeconomics includes Rio Blanco and Garfield Counties since these counties would provide both the worker force and would receive the tax and royalty income that would be generated by the Proposed Action and other nearby projects.

The development of additional natural gas wells in the Project Area, combined with other oil and gas development in the region, and other projects would result in a cumulative increase in employment and tax revenues that would benefit Rio Blanco and Garfield Counties.

6.0 CONSULTATION AND COORDINATION

6.1 INTRODUCTION

An Environmental Assessment (EA) is required under the National Environmental Policy Act (NEPA) when a federal government agency considers approving an action within its jurisdiction that may impact the human environment. The EA aids a federal agency in making decisions on such an action by presenting information on the physical, biological, and social environment of a Proposed Action and alternatives. The EA for the Figure Four Natural Gas Project was prepared by a third party contractor working under the direction of and in cooperation with the lead agency for the project, which is the Bureau of Land Management (BLM), White River Field Office, Meeker, Colorado.

6.2 AGENCY CONSULTATION

During the preparation of this EA, the BLM and the members of the project team have communicated with representatives from various federal, state, county, and local agencies, and individuals concerned with the proposed project. The following agencies, organizations and individuals provided comments or were provided the opportunity to comment on the Proposed Action.

FEDERAL OFFICES

U.S. Army Corps of Engineers
U.S. Bureau of Land Management
U.S. Fish and Wildlife Service

STATE & LOCAL AGENCIES

Colorado Division of Wildlife
Colorado Oil and Gas Conservation Commission
Colorado State Historic Preservation Office
Colorado Department of Public Health and Environment

NATIVE AMERICAN ORGANIZATIONS

Northern Ute Tribe

LOCAL MEDIA

Rio Blanco Herald
Grand Junction Daily Sentinel
Glenwood Post
Rifle Citizen Telegram
Craig Daily Post

6.3 LIST OF PREPARERS

A list of the various specialists that prepared the Figure Four Project Environmental Assessment is provided in Table 6-1.

Table 6-1. List of Preparers of the Figure Four Natural Gas Project EA

Project Team		
Name	**Affiliation**	**Responsibility**
BLM Oversight		
Keith Whitaker	White River Field Office	Project Lead, Visual Resources
Glenn Klingler	White River Field Office	Wildlife including Sensitive Species
Ed Hollowed	White River Field Office	Wildlife including Sensitive Species
Tamara Meagley	White River Field Office	Vegetation and Sensitive Plant
Chris Ham	White River Field Office	Recreation, Transportation
Mark Hafkenschiel	White River Field Office	Range Resources
Michael Selle	White River Field Office	Cultural and Paleontological Resources
Carol Hollowed	White River Field Office	Water Resources and Soils
Paul Daggett	White River Field Office	Geology and Minerals
Scott Archer	National Science and Technology Center	Air Quality
Third Party Contractor		
Chris Freeman	Buys & Associates	Project Manager; Land Use, Recreation, Visual Resources, Socioeconomics
Dave Nicholson	Buys & Associates	Geology, Soils, Water Resources
Kirby Carroll	Buys & Associates	Wildlife Resources, T/E Species
Andy Dworak	Buys & Associates	Vegetation, Wetlands, T/E Species
Don Douglas	Buys & Associates	Air Quality, Air Modeling, Noise
Doug Henderer	Buys & Associates	Air Quality

Elizabeth Pennefather O'Brien	Metcalf Archaeological Consultants	Cultural Resources
Roger Melick	Buys & Associates	GIS/Figures/Maps
Melissa Wood	Buys & Associates	Document Editing & Production

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